

FLORA OF LOS ANGELES
AND VICINITY



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FLORA OF LOS ANGELES AND VICINITY

BY

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PREFACE

As a student of the flora of southern California, the author has long felt the need of some one book containing descriptions of the native plants. While it is essential that one doing critical work should laboriously search through scattered literature, the average student, and especially the novice, will find such a course impossible. In an endeavor to supply this need, the author has written this book. Not that he feels that the flora is so well known that such a work will prove adequate for years to come, but rather to bring together what knowledge now exists concerning the systematic side of our most interesting plant life. That many mistakes must unavoidably occur, and that many plants are yet to be added, is clearly apprehended.

The exact area included in this volume is the coast slope of Los Angeles and Orange Counties. This territory comprises a large portion of the great southern California valley, as well as the following mountain ranges, in each of which is named the culminating point: Sierra Santa Monica (Castro Peak 3946 ft.), Sierra San Fernando (San Fernando Peak 3793 ft.), Sierra San Gabriel (Mt. Gleason 6493 ft., San Gabriel Peak 6172 ft., Mt. San Antonio 10080 ft.), Sierra Santa Ana (Santiago Peak 5675 ft.). A number of the more conspicuous and common plants of southern California not known to occur within our boundaries are included, however, so that the student will find that a great majority of the plants to be met with on the coast slope south of Point Conception are described.

In the preparation of the text the author has made frequent use of published descriptions, especially original

ones, only such changes being made as seemed necessary either on account of uniformity or to bring out unobserved characters. Published lists of our local flora have also been constantly consulted, but it is only justice to the author to say that he has personally collected nearly all the plants included in this work and has added many species not heretofore reported from our region. Duplicates of these specimens, as well as many others from southern California, are to be found in the Leland Stanford Jr. University Herbarium.

The author wishes to express his thanks to the following persons for assistance in various ways: Mr. S. B. Parish, Dr. A. Davidson and Dr. H. E. Hasse for valuable notes; Miss Alice Eastwood for the privilege of examining the material in the California Academy of Sciences Herbarium; Dr. N. L. Britton, Dr. B. L. Robinson, Dr. E. L. Greene, Dr. P. A. Rydberg and Dr. J. K. Small for notes on doubtful forms; finally to Prof. William R. Dudley, who has not only given many critical notes and valuable suggestions which have aided greatly toward the completion of the work, but has also shown many personal favors which have rendered the task a pleasant one to the author.

It has been thirteen years since the above preface to the first edition was written, and in that time, chiefly due to the enthusiasm of a few local botanists, notably S. B. Parish, Dr. A. Davidson, Professor C. F. Baker, Ernest Branton, George L. Moxley, Helen D. Gies, Fordyce Grinnell, I. M. Johnston and the late Dr. H. E. Hasse, a number of additional species have been recorded. Many of these were included in the "supplemented edition" published in 1911.

In order that the present edition may be more convenient and thereby further facilitate the study of the local flora, it is brought out in pocket size. And for the same reason keys to the species are added.

KEY TO THE FAMILIES

SUBKINGDOM SPERMATOPHYTA.

Ovules and seeds borne on the face of a scale. Class 1. GYMNOSPERMAE.
Ovules and seeds contained in a closed cavity (ovary). Class 2. ANGIOSPERMAE.

CLASS I. GYMNOSPERMAE.

Represented with us by 1 family.

PINACEAE, 1.

CLASS II. ANGIOSPERMAE.

Cotyledons 1; stem endogenous. Subclass 1. MONOCOTYLEDONES.
Cotyledons 2; stem exogenous. Subclass 2. DICOTYLEDONES.

SUBCLASS 1. MONOCOTYLEDONES.

Leaves usually parallel-veined; flowers mostly 3-merous or 6-merous.

Perianth none or when present not petaloid.

Perianth of minute scales or bristles or wanting.

Flowers aggregated or scattered, not in the axils of chaffy bracts.

Marsh or subaquatic plants.

Flowers unisexual, in separate heads or spikes, the staminate uppermost.

Flowers in spikes; perianth of capillary bristles.

TYPHACEAE, 8.

Flowers in heads; perianth of small scales.

SPARGANIACEAE, 9.

Flowers perfect or polygamous.

SCHEUZERIACEAE, 14.

Immersed or floating aquatic plants.

Immersed or with some of the leaves floating.

Fresh water plants; flowers not on a spadix; pollen spherical.

ZANNICHELLIACEAE, 10.

Flowers spicate or in axillary clusters.

Flowers solitary in the axils, unisexual.

NAIADACEAE, 12.

Marine plants; flowers on a spadix; pollen filamentous.

ZOSTERACEAE, 11.

Minute floating plants.

LEMNACEAE, 70.

Flowers in the axils of chaffy bracts (glumes).

Glumes 2 to each flower.

POACEAE, 18.

Glumes 1 to each flower.

CYPERACEAE, 58.

Perianth of 6 chaffy scales.

JUNCACEAE, 72.

Perianth petaloid.

Pistils several distinct, forming achenes.

ALISMACEAE, 16.

Pistils united into a compound ovary.

Ovary superior.

LILIACEAE, 76.

Ovary inferior.

Stamens 3; perianth regular.

IRIDACEAE, 84.

Stamens 1 or 2; perianth irregular.

ORCHIDACEAE, 85.

SUBCLASS 2. DICOTYLEDONES.

Leaves mostly netted-veined; flowers seldom 3-merous or 6-merous, usually 4-merous or 5-merous.

Petals separate and distinct from each other or sometimes wanting, rarely somewhat united.

Series 1. CHORIPETALAE.

Petals partly or wholly united, rarely separate or wanting.

Series 2. SYMPETALAE.

SERIES 1. CHORIPETALAE.

Petals distinct, at least at base, except in some species of *Montia*, *Silene* and *Crassulaceae*.

Petals wanting.

(A) *Flowers unisexual, one or both kinds in aments; trees or shrubs.*

Staminate flowers in aments, pistillate becoming a nut.

Leaves pinnate.

JUGLANDACEAE, 93.

Leaves entire or variously lobed or toothed.

FAGACEAE, 95.

Staminate and pistillate flowers both in aments.

Leaves opposite; flowers diœcious.

GARRYA, 268.

Leaves alternate.

Flowers dioecious; fruit a capsule.

SALICACEAE, 89.

Flowers monoecious; fruit not a capsule.

Pistillate flowers becoming wax-coated berries.

MYRICACEAE, 92.

Pistillate flowers with their scales becoming a woody cone.

BETULACEAE, 94.

(B) *Flowers not in aments.*

* *Ovary superior.*

1. HERBS.

Calyx and corolla both wanting.

Flowers perfect, in spikes, these surrounded at base by a conspicuous white involucre.

SAURURACEAE, 88.

Flowers monoecious.

Aquatic plants.

Leaves dissected.

CERATOPHYLLACEAE, 137.

Leaves entire.

CALLITRICHACEAE, 216.

Terrestrial plants; flower-clusters surrounded by a petaloid involucre; ovary 3-celled, raised above the staminate flowers; the whole appearing as a single flower.

EUPHORBIACEAE, 211.

Calyx present; corolla wanting.

Pistil 1.

Ovary 1-celled, 1-ovuled.

Stipules present.

Leaves alternate.

Stipules not sheathing.

Flowers monœcious; herbage with stinging hairs.

URTICACEAE, 98.

Flowers perfect, fascicled; diminutive annual.

ALCHEMILLA, 183.

Stipules sheathing; calyx usually 6-parted, often petaloid.

POLYGONACEAE, 101.

Leaves opposite, pungent; petals represented by minute scales.

PENTACAENA, 137.

Stipules none.

Calyx petaloid.

Calyx 6- (rarely 5-) parted; seed a 3-sided or lenticular achene.

POLYGONACEAE, 101.

- Calyx tubular, its base hardening and enclosing the achene. NYCTAGINACEAE, 124.
 Calyx not petaloid.
 Sepals herbaceous; herbage more or less succulent and scurvy. CHENOPODIACEAE, 113.
 Sepals membranous or scarious; flowers with bractlets. AMARANTHACEAE, 121.
 Ovary 3-10-celled.
 Flowers perfect.
 Ovary 3-5-celled. AIZOACEAE, 126.
 Ovary 10-celled. PHYTOLACCACEAE, 124.
 Flowers monoecious or dioecious; ovary 3-celled. EUPHORBIACEAE, 211.
 Pistils several, each 1-celled, 1-ovuled. THALICTRUM, 142.

2. TREES AND SHRUBS.

- Leaves opposite.
 Flowers diœcious; low maritime shrub; leaves fleshy. BATIDACEAE, 123.
 Flowers perfect or dioecious; sepals petaloid; fruit a tailed achene. CLEMATIS, 140.
 Flowers perfect; fruit a samara. FRAXINUS, 277.
 Leaves alternate.
 Flowers perfect; sepals petaloid.
 Sepals 6; stamens 9.
 Stamens opening by uplifted valves; aromatic tree. LAURACEAE, 143.
 Stamens splitting longitudinally; shrubs. ERIOGONUM, 106.
 Calyx 5-cleft; stamens 5, monadelphous. FREMONTODENDRON, 230.
 Flowers monoecious in head-like clusters. PLATANACEAE, 176.
 Flowers perfect or unisexual; sepals and stamens 4 or 5; fruit berry-like. RHAMNUS, 221.

*** Ovary inferior.*

- Herbs; leaves alternate, divided. DATISCEAEAE, 236.
 Woody plants, parasitic on trees or shrubs. LORANTHACEAE, 100.

Petals present.

** Ovary superior.*

1. STAMENS HYPOGYNOUS.

Stamens more than 10.

- Pistils several to many.
 Pistils simple and distinct. RANUNCULACEAE, 138.
 Pistils becoming achenes or follicles.
 Pistils at first united, becoming distinct and forming tortulose pods. PLATYSTEMON, 145.
 Pistils cohering around a central axis. MALVACEAE, 226.
 Pistil 1.
 Pistil 1-celled.
 Sepals persistent. CALANDRINIA, 129.
 Sepals 2. CISTACEAE, 232.
 Sepals 5, the 2 outer smaller, bract-like.
 Sepals caducous; petals 4 or 6, twice as many as sepals. PAPAVERACEAE, 144.
 Pistil more than 1-celled. MALVACEAE, 226.

Stamens 10 or fewer.

- Pistils more than 1, distinct or more or less united around a central axis.
 Pistils distinct. RANUNCULACEAE, 138.
 Pistils exceeding the sepals and petals in number. CRASSULACEAE, 165.
 Pistils, petals and sepals of the same number.

- Pistils several, more or less united around a central axis, elastically separating as 1-seeded carpels. GERANIACEAE, 207.
- Pistil 1.
- Corolla regular.
- Ovary 1-celled.
- Anthers opening by longitudinal slits.
- Fruit a capsule dehiscent at the apex by valves or teeth.
- Placentae central or basal.
- Calyx tubular or of 4-5 distinct sepals. CARYOPHYLLACEAE, 130.
- Calyx of 2 distinct sepals. PORTULACACEAE, 128.
- Placentae parietal; calyx tubular. FRANKENIACEAE, 231.
- Fruit indehiscent; sepals and petals 4. BRASSICACEAE, 149.
- Anthers opening by uplifted valves; shrubby plants. BERBERIDACEAE, 142.
- Ovary more than 1-celled.
- Herbs.
- Leaves opposite.
- Calyx of 2 distinct sepals. ELATINACEAE, 231.
- Calyx tubular. SILENE, 131.
- Leaves alternate or basal.
- Sepals and petals 4; stamens 6, sometimes 2 or 4.
- Ovary 1-celled, stipitate. CAPPARIDACEAE, 163.
- Ovary 2-celled, not stipitate. BRASSICACEAE, 149.
- Sepals and petals 5; capsule 5-celled.
- Stamens 10; leaves compound.
- Leaves 3-foliolate. OXALIDACEAE, 208.
- Leaves pinnate.
- Ovule 1 in each cell. LIMNANTHACEAE, 217.
- Ovules 3-5 in each cell. ZYGOPHYLLACEAE, 217.
- Stamens 5; leaves entire. LINACEAE, 209.
- Shrubs or trees.
- Petals and sepals 4; stamens 6; ovary stipitate.
- Petals and stamens 2; fruit a simple samara. ISOMERIS, 163.
- Corolla irregular. FRAXINUS, 277.
- Corolla papilionaceous or papilionaceous-like.
- Stamens 10; diadelphous or monadelphous; corolla papilionaceous. FABACEAE, 187.
- Stamens 6-8, monadelphous; petals 3, papilionaceous-like. POLYGALACEAE, 210.
- Corolla not papilionaceous.
- Stamens 5; petals 5, 1 spurred; sepals auricled. VIOLACEAE, 233.
- Stamens 6; sepals 2; petals 4, in 2 dissimilar pairs. BICUCULLA, 148.
- ## 2. STAMENS PERIGYNOUS.
- Stamens on an hypogynous disk or on a disk lining the base of the calyx.
- Herbs; disk 1-sided. RESEDACEAE, 164.
- Trees or shrubs.
- Stamens equaling the petals in number and opposite them.
- Shrubs; petals commonly hooded; ovary usually 3-celled. RHAMNACEAE, 221.
- Woody vines climbing by tendrils; petals early deciduous. VITACEAE, 226.
- Stamens exceeding the petals in number.
- Fruit drupe-like; styles or stigmas 3. ANACARDIACEAE, 218.
- Fruit a double samara; leaves simple. ACERACEAE, 220.
- Stamens on the calyx.
- Corolla irregular; fruit a legume. FABACEAE, 187.
- Corolla regular.
- Stamens more than 10; pistils 1-many.

- Pistils several, or when 1 not becoming a drupe. ROSACEAE, 177.
 Pistil 1, becoming a drupe. AMYGDALACEAE, 185.
 Stamens 5-10.
 Fruit a legume. MIMOSACEAE, 186.
 Fruit not a legume. SAXIFRAGACEAE, 169.
 Calyx campanulate. LYTHRACEAE, 239.
 Calyx tubular.

**** Ovary inferior.**

Trees and shrubs.

- Stamens exceeding the petals in number; fruit a pome. MALACEAE, 183.
 Stamens as many as petals. RHAMNACEAE, 221.
 Stamens opposite the petals.
 Stamens alternate with the petals.
 Leaves alternate; fruit a smooth or prickly berry. GROSSULARIACEAE, 172.
 Leaves opposite; fruit drupe-like. CORNACEAE, 267.

Herbs.

- Petals and stamens many; fleshy maritime herbs. MESEMBRYANTHEMUM, 127.
 Petals 5 or fewer.
 Style evident.
 Style 1.
 Sepals and petals 4; capsule 4-celled. ONAGRACEAE, 240.
 Sepals and petals 5; capsule 1-celled. LOASACEAE, 234.
 Styles more than 1.
 Styles 4-5; fruit berry-like. ARALIACEAE, 252.
 Styles 2; fruit dry, formed of 2 1-celled carpels. AMMIACEAE, 253.
 Style none; stigmas 4; aquatic plants. HALORAGIDACEAE, 251.
Fleshy spiny plants, with jointed stems. CACTACEAE, 237.

SERIES 2. SYMPETALAE.

Petals united, at least below, except in *Pyrolaceae*, *Plumbaginaceae* and *Oleaceae*.

*** Ovary superior.**

Corolla regular.

- Stamens free from the corolla; anthers opening by pores.
 Petals distinct or nearly so. PYROLACEAE, 269.
 Petals united.
 Herbaceous saprophytes, without green foliage. MONOTROPACEAE, 271.
 Trees and shrubs. ERICACEAE, 271.
 Stamens adnate to the corolla.
 Stamens opposite the corolla-lobes.
 Style 1; fruit capsular, many-seeded. PRIMULACEAE, 275.
 Styles 5; fruit utricular, 1-seeded. PLUMBAGINACEAE, 277.
 Stamens alternate with the corolla-lobes.
 Ovaries 2, separate, becoming follicles.
 Filaments distinct. APOCYNACEAE, 279.
 Filaments monadelphous. ASCLEPIADACEAE, 280.
 Ovary 1.
 Cells to the ovary 1.
 Leaves opposite, entire. GENTIANACEAE, 278.
 Leaves mostly alternate, seldom entire. HYDROPHYLLACEAE, 293.
 Cells of the ovary 2-4.
 Corolla not scarious.
 Ovary not lobed.
 Ovary 2-celled.
 Leafy plants.

- Calyx 5-toothed. SOLANACEAE, 320.
- Calyx of 5 distinct sepals. CONVULVULACEAE, 282.
- Leafless parasitic plants, with yellowish herbage. CUSCUTACEAE, 284.
- Ovary 3-celled; styles 3-cleft; capsule 3-valved. POLEMONIACEAE, 286.
- Ovary deeply 4-lobed, forming 4 1-seeded nutlets. BORAGINACEAE, 302.
- Leaves alternate. MENTHACEAE, 310.
- Leaves opposite. PLANTAGINACEAE, 343.
- Corolla scarious; ovary 2-4-celled.

Corolla irregular.

- Ovary 1-2-celled; ovules numerous.
 - Ovary 1-celled; parasitic plants without green foliage. OROBANCHACEAE, 342.
 - Ovary 2-celled; plants with green foliage. SCROPHULARIACEAE, 326.
- Ovary 4-celled, with 1 ovule in each cell.
 - Ovary not lobed. VERBENACEAE, 309.
 - Ovary deeply 4-lobed, splitting into 4 nutlets. MENTHACEAE, 310.

**** *Ovary inferior.***

- Stamens distinct.
 - Leaves alternate.
 - Leaves opposite or whorled.
 - Ovary 1-celled.
 - Stamens 1-3; slender spring annuals. VALERIANACEAE, 350.
 - Stamens 2-4; stout late summer herbs. DIPSACEAE, 350.
 - Ovary 2-5-celled.
 - Ovary 2-celled; flowers regular, minute; stems usually 4-angled. RUBIACEAE, 345.
 - Ovary 2-5-celled; flowers regular or irregular. CAPRIFOLIACEAE, 347.
- Stamens united into a tube around the ovary.
 - Flowers not in heads.
 - Stamens 3; flowers regular. CUCURBITACEAE, 351.
 - Stamens 5; flowers irregular. CAMPANULACEAE, 353.
 - Flowers in heads on a common receptacle, ligulate or tubular. ASTERACEAE, 356.

FLORA OF LOS ANGELES AND VICINITY

Family 1. PINACEAE. PINE FAMILY.

Resinous evergreen or rarely deciduous trees or shrubs, with linear, needle-like or scale-like leaves, arranged in spirals or cycles. Flowers surrounded at base by the persistent bud scales, monoecious or dioecious, the staminate consisting of few to many stamens, with 2 to several pollen sacs, the ovulate of few to many scales, bearing 1 to several pendent or erect ovules on their inner surface. Fruit a woody cone, or the scales becoming fleshy and coalescent (*Juniperus*). Seeds with or without wings; embryo axile in the copious endosperm; cotyledons 2 to several.

A family of about 45 genera and approximately 225 species, widely distributed over the globe but most abundant in the north temperate zone. On account of the great interest of this family all the species found in southern California are described.

Leaves not scale-like, spirally arranged.

Leaves surrounded at base by a deciduous or persistent sheath, in bundles of 2-5 (solitary in one species).

1. PINUS.

Leaves naked, scattered and often appearing 2-ranked.

Cones pendent, their scales persistent.

2. PSEUDOTSUGA.

Cones erect, their scales deciduous.

3. ABIES.

Leaves scale-like, in cycles of 2-4.

Cones woody; monoecious.

Leaves appearing as if in whorls of 4; cones and scales oblong.

4. LIBOCEDRUS.

Leaves in whorls of 2; cones globose; scales peltate.

5. CUPRESSUS.

Cones berry-like, the scales coalescent and more or less fleshy.

6. JUNIPERUS.

1. PINUS L. PINE.

Evergreen trees with 2 kinds of leaves, the primary ones linear or scale-like, deciduous; the secondary ones forming the ordinary foliage, narrowly linear, arising from the axils of the former in fascicles of 2-5, or solitary in a single species; subtended by the bud scales, some of which are united to form a sheath. Staminate cones borne at the bases of the shoots of the season, the clusters of stamens spirally arranged each in the axil of a minute scale; filaments very short; anthers 2-celled, longitudinally dehiscent. Ovule-bearing cones solitary or clustered, borne on the twigs of the preceding year, composed of numerous imbricated minute bracts, each with an ovule-bearing scale in its axil, ripening into a large cone, which matures the following autumn, its scales elongating and becoming woody. Seeds 2 on the base of each scale, winged above, the testa crustaceous.

Sheaths of the leaves deciduous; leaves with 1 fibro-vascular bundle.

Leaves in 5's; cones with terminal unarmed umbos.

Cones 3-5 dm. long; seeds much shorter than the wings, these not persistent on the scale.

Cones about 1 dm. long; seeds much longer than the wings, these persistent on the scale.

Leaves in 1-4-leaved clusters; cones subglobose; scales few, much thickened; seeds large; wings a mere ring.

Leaves usually in 4's.

Leaves solitary.

Sheaths of the leaves persistent; leaves with 2 fibro-vascular bundles.

Leaves in 5's.

Leaves in 2-3-leaved clusters.

Leaves in 3's.

Cone scales with dorsal slender prickles.

Cones symmetrical, opening at maturity, deciduous, the basal scales persistent on the branches.

Leaves yellow green; twigs not glaucous; cones 7-15 cm. long.

1. *P. lambertiana*.

2. *P. flexilis*.

3. *P. quadrifolia*.

4. *P. monophylla*.

5. *P. torreyana*.

6. *P. ponderosa*.

Leaves dull blue green; twigs glaucous; cones 15-35 cm. long.

7. *P. jeffreyi*.

Cones unsymmetrical, their outer scales much enlarged toward the base of the cone, remaining closed and persistent on the branches for many years.

8. *P. attenuata*.

Cone scales prolonged into stout, straight or incurved spur-like spines; cones large and heavy.

Leaves gray green, drooping; cones chocolate brown; seeds longer than wings.

9. *P. sabiniana*.

Leaves blue green, erect; cones light brown; seeds shorter than wings.

10. *P. coulteri*.

Leaves in 2's; cones small, opening at maturity and deciduous.

11. *P. murrayana*.

1. ***P. lambertiana*** Dougl. (SUGAR PINE.) Becoming a large tree, with light brown smoothish bark, splitting in small sections; leaves 8-10 cm. long, with 5-6 lines of stomata on each of the 3 sides; staminate cones oval, 1 cm. long, with 10-15 involucre scales; anthers denticulate-crested; fruiting cones cylindric, bright brown, 2-4 dm. long, 8-10 cm. broad, on peduncles 8 cm. long; seeds smooth, black, 12 mm. long; wing scarcely twice as long, widest below the middle, obtuse; cotyledons 13-15.

Frequent in the San Gabriel and San Bernardino Mountains, 6000-8000 feet altitude. This species is the largest of all pines.

2. ***P. flexilis*** James. (LIMBER PINE.) A middle-sized tree with furrowed gray bark; leaves 5, 3-6 cm. long, thick and rigid; staminate cones oval, 12-14 mm. long, involucre bracts 8-9; anthers tipped by a spur; fruiting cones oval to subcylindric, 8-16 cm. long, light brown, scales rounded or pointed at the apex; seeds oval, compressed, 8-12 mm. long; wing minute, scarcely exceeding 1 mm. in width, usually remaining attached to the scale.

Summits of San Geronio, San Jacinto and Santa Rosa Mountains.

3. ***P. quadrifolia*** Parl. (PARRY PINE.) A small tree, 6-10 m. high, with a round top; bark dark brown tinged with red, divided by shallow fissures; leaves 3-5 (mostly 4) in a sheath, stout, glaucous, 30-45 mm. long; staminate cones oval, about 5 mm. long, surrounded by 4 conspicuous bracts; fruiting cones subglobose, 3-5 cm. broad; scales thickened at apex, rounded, conspicuously keeled, narrowed with a central knob terminating in a truncate or concave umbo, armed with a minute recurved mucro, bright chestnut brown, the rest of the scale dull red; seeds oval, 10-16 mm. long; wings brown, about 2 mm. wide, remaining attached to the scale. (*P. parryana* Engelm.)

Santa Rosa Mountains, southward on the desert slopes to northern Lower California.

4. *P. monophylla* Torr. & Frem. (PIÑON.) A small tree, 5-8 m. high, with irregularly spreading branches and pale flaky bark; leaves short, spiny-tipped, solitary, terete, 3-5 cm. long; staminate cones oval with 6 involucre bracts; fruiting cones 3-6 cm. long and nearly as broad, bright green, apex of scale thickened, 4-angled, narrowed into a prominent knob with a usually truncate umbo ending in a minute incurved tip; seeds oblong, 12-20 mm. long; wing light brown, 8-12 mm. wide, remaining attached to the scale.

Frequent on the desert slopes of the San Gabriel and San Bernardino Mountains.

5. *P. torreyana* Parry. (DEL MAR or TORREY PINE.) A small tree, 6-10 m. high, with spreading branches and dark brownish bark; leaves 5 in a cluster, crowded at the ends of the thick branchlets, stout, 20-28 cm. long; staminate cones cylindric, about 5 cm. long and 8 mm. thick, involucre bracts 14; fruiting cones broadly ovate, 10-15 cm. long, chocolate brown; scales much thickened at apex into broad straight or reflexed umbos terminating in minute spines; seeds oval, 16-20 mm. long, nearly enclosed by the thickened rim of the dark brown wings, these 8-10 mm. wide.

Delmar, San Diego County; Santa Rosa Island. This is the rarest species of pines.

6. *P. ponderosa* Dougl. (YELLOW PINE.) A large tree with very thick red-brown bark; deeply furrowed and split in large plates; leaves 3 in each cluster on stout branchlets, dark green, 15-25 cm. long; staminate cones cylindric, 35-50 mm. long, involucre bracts 10-12; fruiting cones oval, 7-12 cm. long, rich brown; scales thickened into a central knob terminating in compressed straight or recurved umbos, awned with slender spines; seeds ovate, acute, about 8 mm. long, coat nearly black, rugose; wing thin, pale brown, 25-30 mm. long and about 20 mm. wide below the middle.

Common on all our mountains, making up a greater part of the coniferous forests. The cones usually fall during the autumn and winter after maturity.

7. *P. jeffreyi* Oreg. Com. (JEFFREY PINE.) Closely resembling the preceding in foliage and habit; bark deeply furrowed, not split in large plates, dark; staminate cones 3 cm. long; fruiting cones oval, rather rich brown, 15-30 cm. long; seeds 8-10 mm. long; wings about 25 mm. long.

With the last, but much less common. Rather frequent in the San Bernardino Mountains, especially about Bear Valley. Distinguished from *ponderosa* by the glaucous twigs, bluish tinge to leaves, and large cones.

8. *P. attenuata* Lemmon. (KNOB-CONE PINE.) A small tree usually less than 10 m. high, somewhat irregularly branched; bark light brown, roughish; leaves in clusters of 3, 10-15 cm. long, dark green; staminate cones, cylindric, 14-15 cm. long, with 6 involucre bracts; fruiting cones clustered in verticils, persistent for many years, light chestnut-brown becoming grayish, elongated-conic, oblique at the base, 8-14 cm. long; scales armed with stout prickles; seeds black, grooved, 6 mm. long; wing 14-16 mm. long, widest near the middle. (*P. tuberculata* Gordon.)

Extending in a narrow belt along the southern slope of the San Bernardino Mountains, 2500-4000 feet altitude on City Creek Road.

9. *P. sabiniana* Dougl. (DIGGER PINE or SILVER PINE.) A rather small open-topped irregularly branched tree; leaves 3 in a cluster, drooping, light green or glaucous, 2-3 cm. long; staminate cones oblong, about 2 cm. long, with 10-15 involucre bracts; fruiting cones lateral, short oval, acutish, 15-25 cm. long, 10-15 cm. in diameter, deep chestnut-brown; scales produced into prominent knobs awned with stout straight or slightly incurved spines; seeds subcylindric, dark, 18-24 mm. long; wing about half as long.

• Antelope Valley, ranging northward to the upper Sacramento. Confined to the foothills.

10. *P. coulteri* Lamb. (COULTER PINE.) A middle-sized tree, with thick rough bark; leaves crowded at the ends of the thick branches in clusters of 3, stiff and erect, 15-25 cm. long, dark blue-green; staminate cones cylindric, 35-40 mm. long, with 8-10 involucre bracts; fruiting cones long-oval, pointed, 25-35 cm. long, 10-12 cm. thick, yellowish-brown, persistent; scales with a stout elongated umbo armed with thick incurved spines; seeds oval, black, 12-16 mm. long; wing 20-30 mm. long.

Rather frequent in the coniferous forests of the San Bernardino, San Jacinto and Cuyamaca Mountains, less so in the San Gabriel, 4500-7000 feet altitude.

11. *P. murrayana* Oreg. Com. (MURRAY PINE or TAMARACK PINE.) Becoming a rather large tree, 15-40 m. high; bark rather finely furrowed, grayish-brown; leaves 2, 25-75 mm. long, very stout and rigid; sheaths 8-12 mm. long when young; staminate cones with 6-8 involucre bracts, cylindric, 10-15 mm. long; fruiting cones clustered or in pairs, oval or subcylindric, oblique, 2-5 cm. long; scales armed with slender recurved prickles; seeds scarcely 2 mm. long, dark brown mottled with black; wings light brown, widest above the base, tapering to apex, 12-15 mm. long.

Frequent in the upper portions of the coniferous forests. Mt. San Antonio; Bear Valley; Mt. San Geronimo; Mt. San Jacinto.

2. *PSEUDOTSUGA* Carr. FALSE SPRUCE.

Evergreen trees with flat petioled leaves, appearing 2-ranked by a twist of the petiole, leaving an oval scar on the smooth branches. Staminate cones oblong or cylindric, partly enclosed by conspicuous orbicular bud-scales, scales ending in a short spur; anthers 2, obliquely splitting. Pistillate cones with the scales much shorter than the broadly linear acutely 2-lobed and long-pointed aristulate bracts, maturing the first year. Seeds without resin-vesicles, the wing at last breaking off; cotyledons 6-12.

1. *P. macrocarpa* (Torr.) Mayr. (BIG-CONE SPRUCE.) Tree 12-18 m. high, rarely 1 m. in diameter, branches spreading; leaves

rather narrow, acutish; staminate cones about 2 cm. long; fruiting cones 12–18 cm. long, 5–6 cm. thick; scales large, rather thick; bracts somewhat exceeding the scales; seeds including wing about 10 mm. long; cotyledons 9–12.

Rather common in all our mountains except the Santa Monica. Ranging mostly from 2000–5000 feet altitude, being confined for the most part to canyons and north slopes in the upper portions of the chaparral belt and extending into the pine belt.

3. *ABIES* Link. FIR.

Evergreen trees with sessile leaves appearing 2-ranked by a twist of the petiole leaving a circular scar on the smooth branches, more or less flattened and emarginate, bearing stomata only or mainly on the lower surface, with 2 longitudinal resin-ducts mostly close to the epidermis on the lower side. Staminate cones oval or cylindric, scales terminating in a knob, bearing 2 anthers, these transversely dehiscent. Pistillate cones erect, the bract much larger than the scale. Fruiting cones erect, maturing the first year, scales and enclosed or exerted membranous bracts falling at maturity from the persistent axis. Seeds partly and permanently enclosed by the base of the wing; cotyledons 4–10.

1. *A. concolor* (Gord.) Parry. (WHITE FIR.) Often becoming a large tree with rough grayish bark; leaves obtuse, pale green, with stomata on both sides, 2–3 cm. long or on young trees often 5 cm. long, convex above, somewhat falcate; mature cones oblong-cylindric, 8–12 cm. long, 3–4 cm. thick, pale green; scales 24–30 mm. broad, but little over half as long; bracts short enclosed, truncate or emarginate, with or without a short mucro; wing of the seeds oblique, as broad as long; cotyledons 5–7.

Frequent in the coniferous forests of the San Gabriel, San Bernardino, San Jacinto and Cuyamaca Mountains.

4. *LIBOCEDRUS* Endl. INCENSE CEDAR.

Evergreen aromatic trees with thin fibrous bark and scattered flattened branches. Leaves scale-like, adnate and imbricate in 4 rows, oblong, with free acute tips, somewhat dimorphous. Staminate cones of 12–16 subpeltate broadly ovate pointed scales, bearing usually 4 pollen-sacs. Pistillate cones composed of 4–6 small coriaceous valvate scales, only the middle pair fertile; ovules 2. Mature cones oblong, scales oblong; seeds unequally 2-winged, maturing the first year.

1. *L. decurrens* Torr. Mostly a rather small tree with bright cinnamon-red bark and spreading branches; leaves pale green, 4–8 mm. long, the lateral ones without glands, nearly covering the flattened, obscurely pitted inner ones; staminate cones oblong-ovate, 5–6 mm. long; fruiting cones 2 cm. long and about 8 mm. thick; scales with short somewhat recurved mucro; seeds oblong-lanceolate, 8–12 mm. long, the narrow outer wing scarcely longer, the inner broader and nearly equaling the scale.

Frequent in the coniferous forests of the San Gabriel, San Bernardino, San Jacinto and Cuyamaca Mountains.

5. *CUPRESSUS* L. CYPRESS.

Resinous aromatic trees with fibrous bark, light brown durable and fragrant wood, stout erect or horizontal branches and naked buds. Leaves scale-like, decussate, ovate, acute, acuminate or rounded at the apex. Flowers monoecious, small, terminal on the branchlets; the staminate rounded to oblong, yellowish, with subpeltate scales bearing 3 to 5 subtended pollen sacs; the ovulate green and inconspicuous, the pointed scales spreading and exposing the numerous erect basal ovules. Cones maturing the second year, globose to oblong, the scales much thickened into a shield-shaped apex with a prominent central boss or prickle, closely fitting and not overlapping, separating at maturity or remaining closed for years. Seeds small, compressed, acutely angled or margined; cotyledons 2 to 5.

1. *Cupressus guadalupensis* S. Wats. (GUADALUPE CYPRESS.) Small tree 10 to 20 ft. high, clothed from the ground with slender ascending branches forming a thin open conical crown; bark of the trunk separating into extremely thin reddish brown scales, exfoliating leaving a smooth polished red-brown inner bark, no persistent bark even at the base of the older trees; leaves on slender terete branchlets, light green, acutish, slightly keeled at the tip, furnished with a dorsal pit, but not resinous-glandular; staminate flowers oblong, with 3 lateral anthers in each row; cones globose, 20–25 mm. broad, light brown, becoming gray brown with age; scales 6 to 8, with central subconical or more or less appressed and crescent-shaped umbos; seeds reddish brown, sharply angled, obscurely warty, 3 mm. long.

Several isolated groves are found in western San Diego County, the most accessible being on the Campo road near Tecata Mountain. Another is nearby in Cedar Canyon and a third is near Descanso. It is also in northern Lower California and on Guadalupe Island. The southern California specimens have been referred to *goveniana*, but the bark is unlike that species or any other Californian cypress. It is a handsome tree and should be substituted in southern California for the less adapted Monterey Cypress.

6. *JUNIPERUS* L. JUNIPER.

Low dioecious or monoecious shrubs or trees, with mostly thin shredded bark and evergreen binate or ternate, free and subulate or adnate and scale-like leaves, not 2-ranked. Cones small, solitary, axillary or terminal upon short lateral branchlets; scales few, decussately binate or ternate. Staminate cones oblong-ovate; anther-cells 4-8 under each shield-shaped scale. Pistillate cone of 2 or 3 series of fleshy scales, with 2 erect ovules to each scale, becoming united into a blue-black or reddish drupe in fruit and ripening the second year. Seeds 1-12, bony; cotyledons usually 2, rarely 4-6.

1. *J. californica* Carr. (CALIFORNIA JUNIPER.) Shrub usually much branched, with stout, spreading branches and branchlets; leaves scale-like, closely appressed, usually 3 in a whorl, ovate to oblong, 5 mm. long, yellow-green, distinctly glandular pitted on the back, bluntly pointed; berries at first bluish with a dense bloom, at maturity reddish brown beneath the bloom, globose-oblong, 12-18 mm. long, nearly smooth, the pulp firm, dry and sweetish; seeds 1 or 2, ovoid, sharp-pointed and angled, 6-9 mm. long, light brown and shining above, dull and yellowish toward the base; cotyledons 4-6.

South of the Tehachapi Mountains this species is chiefly restricted to the desert slopes of the mountains, entering the coastal region only in the interior arid regions. In the vicinity of Los Angeles it is found in the San Gabriel Wash near Azusa and in San Fernando Valley.

2. *J. occidentalis* Hook. (WESTERN JUNIPER.) A tree, usually about 8 m. high, but occasionally 20 m. high, with a trunk 5-15 dm. or rarely 25 dm. in diameter; branches often very large, spreading at right angles and forming a flat top; bark about 7-10 cm. thick, cinnamon brown, divided into wide low irregularly connected ridges, separating at the surface into thin scales; leaves in 3's, closely appressed, acute or acuminate, conspicuously glandular and rounded on the back, 3 mm. long, gray-green, the margins slightly denticulate; staminate flowers with 12-18 stamens; berries rounded to oblong, 6-8 mm. long, blue-black at maturity beneath the glaucous bloom; seeds 2-3, ovate, acute, rounded and grooved or pitted on the back, 3 mm. long; cotyledons 2.

In southern California it is found chiefly above the Yellow Pine belt; Mt. San Antonio near the summit; Pine Lake, San Bernardino Mountains.

Family 2. **TYPHACEAE.** CAT-TAIL FAMILY.

Marsh or aquatic herbs with creeping rootstocks and solid cylindric stems, bearing long linear alternate leaves.

Flowers monoecious, in dense terminal spikes, the staminate spike uppermost. Perianth of numerous fine bristles. Stamens 2-7, filaments connate. Ovary stipitate, 1-2-ovuled. Fruit minute, nut-like; endosperm copious.

1. *TYPHA* L. CAT-TAIL.

The only genus; characters of the family.

1. *T. latifolia* L. Stems stout, 1.5-3 m. high; leaves long, 6-20 mm. wide, sheathing at base; spike 15-25 cm. long, 20 mm. or more in diameter, the staminate and pistillate portions usually contiguous; stigmas rhomboid or spatulate; pollen grains in 4's; fruit furrowed, bursting in water; seeds with separate outer coat.

Frequent along the margins of marshes or slow-running streams. May-July.

2. *T. angustifolia* L. Stems slender, 1.5-3.5 m. high; leaves 4-9 mm. wide; spikes 15-30 cm. long, 4-15 mm. in diameter, the staminate and pistillate portions usually distant; stigmas linear or linear-oblong; pollen grains simple; fruit not furrowed, not bursting in water, outer coat not separable.

In similar places, but not common. Near Los Angeles, *Hasse*; San Bernardino, *Parish*.

Family 3. SPARGANIACEAE. BUR-REED FAMILY.

Marsh or aquatic plants with creeping rootstocks, simple or somewhat branched stems and linear leaves. Flowers in globose heads along the upper portions of the stem and branches, the upper heads staminate, the lower pistillate, in the axils of leaf-like bracts. Perianth of minute irregular scales. Stamens with long slender distinct filaments. Ovaries sessile, mostly 1-celled. Fruit nut-like.

1. *SPARGANIUM* L. BUR-REED.

Characters of the family.

1. *S. greenei* Morong. Stems rather stout, 1-2.5 m. high, branching; leaves linear, flat, slightly keeled beneath, the lowest 1-1.5 m. long, the upper shorter; staminate heads numerous; pistillate heads 2-4, sessile or more commonly peduncled, compact, 20-40 mm. in diameter when mature; style 1; stigmas 1-2; nutlets sessile, obovate, 6-10 mm. long; perianth segments as many as the

angles of the fruit or with 2-3 outer ones, spatulate or eroded, equaling the fruit.

Occasional along streams, usually growing with *Typha*. Los Angeles River; Ballona Creek; New River near Alamitos. May-June.

2. *S. multipedunculata* (Morong) Rydb. A slender plant, with slender fusiform nutlets, widest near the middle.

Bluff Lake, San Bernardino Mountains, *Hall*.

Family 4. ZANNICHELLIACEAE.

PONDWEED FAMILY.

Aquatic plants entirely submerged or with floating leaves. Stems jointed, usually branched. Leaves capillary to lanceolate or with broad floating blades, sheathing at the base. Flowers small, without perianth, commonly borne in spikes or axillary clusters. Stamens 1-4, with extrorse anthers. Ovaries 1 to 4, mostly distinct, 1-celled, 1-ovuled. Carpels rarely dehiscent; endosperm none; embryo often curved.

Flowers perfect; stamens more than 1.

Fruit sessile; stamens 4.

Fruit stalked; stamens 2.

Flowers monoecious; stamens 1.

1. POTAMOGETON.

2. RUPPIA.

3. ZANNICHELLIA.

1. POTAMOGETON L. PONDWEED.

Perennial herbs. Leaves alternate or the uppermost often opposite, often of 2 kinds, submerged and floating, the floating elliptic or ovate, the submerged linear. Spikes sheathed by the stipules in the bud. Peduncles axillary, bearing small perfect flowers. Perianth segments 4, herbaceous, concave, valvate in the bud, short-clawed. Stamens 4, inserted on the claws of the perianth segments; anthers sessile. Ovaries 4, sessile, distinct, 1-celled, 1-ovuled, attenuate into a short erect or recurved style.

With floating and submerged leaves.

Floating leaves thick; fruit pitted on the sides, 2-grooved on the back.

1. *P. natans*.

Floating leaves thin; fruit smooth on the sides, 3-keeled dorsally.

2. *P. americanus*.

With submerged leaves only.

Leaves 2 mm. wide, 3-nerved.

3. *P. foliosus californicus*.

Leaves capillary, 1-nerved.

4. *P. pectinatus*.

1. *P. natans* L. Stems 1–1.5 m. long, simple or sparingly branched; floating leaves thick, ovate-elliptic to lanceolate, rounded or subcordate at base, 4–8 cm. long, mostly shorter than the petiole; submerged leaves reduced to phyllodes or bladeless petioles; peduncle as thick as the stem, 4–8 cm. long; spike dense, 4 cm. long; fruit turgid, 4 mm. long, narrowly obovoid; nutlet pitted on the sides, 2-grooved on the back.

Bear Valley, San Bernardino Mountains. Not known within our limits.

2. *P. americanus* Ch. & Sch. Stems 1–2 m. long, much branched; floating leaves rather thin, elliptic, pointed at both ends, 5–10 cm. long; submerged leaves linear-lanceolate, 10–15 cm. long, 4–20 mm. wide, rounded at base or tapering into a petiole; stipules 2–8 cm. long, free from the leaves; peduncles thickening upward, 4–6 cm. long; spikes dense, 2–4 cm. long; fruit 4 mm. long, obliquely obovoid, sides smooth, 3-keeled on the back. (*P. lonchites*. Tuckerm.)

Occasional in ponds in the valley region.

3. *P. foliosus californicus* Morong. Stems 0.3–1 m. long, much branched, flattened or winged; leaves 3–5 cm. long, 2 mm. wide, 3-nerved or sometimes 5-nerved toward the base; stipules free from the leaves, small, white, becoming setose; peduncles 8–12 mm. long, erect, clavate, flattened; spikes subcapitate, 6–12-flowered; fruit lenticular or nearly orbicular, about 2 mm. long, 3-keeled on the back, middle keel winged, sinuate-dentate, face strongly angled or arched; style apical. (*P. pauciflorus californicus* Morong.)

Occasional in streams and irrigating ditches in the interior valleys. June–September.

4. *P. pectinatus* L. Stems 0.3–1 m. long, slender, much branched, branches repeatedly forking; leaves setaceous, attenuate to the apex, 1-nerved, often capillary and nerveless, 2–10 cm. long; stipules half free, 1–2 cm. long, their sheaths scarious on the margins; peduncles filiform, 4–10 cm. long; spike 1–4 cm. long; flowers in whorls; fruit obliquely obovoid, about 4 mm. long, with two obscure lateral ridges on the back; style straight or curved, facial.

Common in streams and ponds. May–August.

2. RUPPIA L.

Stems capillary, widely branched. Leaves all submerged, very slender, attenuate, 1-nerved, with membranous sheaths at the base. Flowers on a capillary spadix-like peduncle, naked, perfect, consisting of 2 sessile anthers, 2-celled, attached by the back to the peduncle, having between them several pistillate flowers with sessile peltate stigmas in 2 sets on opposite sides of the rachis, the whole at first enclosed in the sheathing base of the leaf; in development the peduncle elongates, bearing the pistillate flowers at the end; fertilization takes place at the surface, after which the peduncle coils up. Fruit a small obliquely pointed drupe, pedicelled.

1. *R. maritima* L. Stems 0.5–1 m. long; leaves 4–6 cm. long; sheaths membranous, 6–8 mm. long; peduncles 4–20 cm. long or more in fruit; pedicels 1–3 cm. long at maturity; drupes with a hard shell, 2 mm. long, ovoid, oblique or gibbous at base, pointed with the long style.

Brackish streams along the coast. June–August.

3. *ZANNICHELLIA* L. HORNED PONDWEED.

Stems capillary, sparsely branched from a creeping rhizome. Leaves all submerged, filiform but flat, 1-nerved. Staminate and pistillate flowers in the same axil, enclosed in the bud by a hyaline spathe-like envelope; staminate solitary, with 2-celled anther on a short pedicel-like filament; pistillate 2–5. Ovary flask-shaped, stipulate at base, tapering into a short style with a broad cup-shaped stigma, its margins angled or dentate. Fruit a flattish falcate nutlet, ribbed or sometimes toothed on the back.

1. *Z. palustris* L. Stems 3–6 dm. high; leaves 2–6 cm. long; spathe separating from the leaves and fruit at maturity; fruits 2–6 in a cluster, 2–4 mm. long, sessile or short pedicelled, sometimes the whole cluster peduncled; style persistent, straight or curved, 1–2 mm. long.

Occasional in marshes and ponds.

Family 5. NAIADACEAE. NAIAS FAMILY.

Slender, branching, submerged aquatics from fibrous roots. Leaves all submerged, opposite or whorled, spiny-toothed, sheathing at the base. Flowers monoecious or dioecious, axillary, solitary, sessile or pedicelled. Staminate with a double perianth; the outer entire or 4-toothed at the apex, the inner one hyaline, adhering to the anthers. Stamen 1, sessile or stalked; anthers 1–4-celled, apiculate or 2-lobed at the summit. Pistillate flowers of a single ovary, tapering into a short style; stigmas 2–4, subulate. Fruit a solitary carpel, sessile, ellipsoidal, with a crustaceous pericarp.

1. *NAIAS* L. NAIAS.

Characters of the family.

1. *N. flexilis* (Willd.) R. & S. Stem slender, forking; leaves linear, pellucid, acuminate or acute, 1–2 cm. long, 1–2 mm. wide, numerous and crowded on the upper branches with 25–30 minute teeth on each margin; fruit 2–4 mm. long, 0.5–1 mm. in diameter; style long, persistent; stigmas short.

Near Soldiers' Home, *Hasse, Davidson*.

Family 6. ZOSTERACEAE. EEL-GRASS FAMILY.

Submerged marine plants with creeping rootstocks, flattened branching stems and sheathing 2-ranked ribbon-like leaves. Flowers monoecious or dioecious, arranged on a one-sided spadix enclosed in a spathe. Perianth none, but flowers enclosed by a hyaline scale. Staminate flowers a single sessile anther arranged in two rows on the spadix; pollen of slender filaments. Pistillate flower of a single 1-celled ovary, with 2 carpels and 2 slender stigmas.

Flowers monoecious; ovary and fruit ovoid.

1. *ZOSTERA*.

Flowers dioecious; ovary and fruit heart-shaped.

2. *PHYLLOSPADIX*.

1. *ZOSTERA* L. EEL-GRASS.

Marine plants, wholly submerged, with slender rootstocks and branching compressed stems. Leaves 2-ranked, sheathing at the base, the sheaths with inflexed margins. Spadix linear, contained in a spathe. Flowers monoecious, arranged alternately in 2 rows on the spadix. Staminate flower merely an anther attached to the spadix near its apex, 1-celled; pollen thread-like. Pistillate flower fixed on its back near the middle. Ovary 1; style elongated; stigmas capillary. Mature carpels flask-shaped, beaked by the persistent style. Seeds ribbed; embryo ellipsoidal.

1. *Z. marina* L. Leaves ribbon-like, obtuse at the apex, 0.5–2 m. long, 5–10 mm. wide; spadix 2–5 cm. long; flowers about 6 mm. long, crowded.

Shoal waters in bays on muddy bottoms. San Pedro.

2. *PHYLLOSPADIX* Hook.

Submerged marine plants with thickened rootstocks and slender stems, which bear the inflorescence at the

summit or in clusters along the upper part. Leaves linear, sheathing. Flowers dioecious in spathes like those of *Zostera*. Spathes with membranous edges, the back thickened and terminating in long leaf-like appendages. Spadix with a series of short dilated foliaceous flaps, which close over the flower, spreading open at maturity. Staminate flowers of numerous sessile stamens in 2 rows; anthers 1-celled. Pistillate of simple sessile ovaries, attenuate into a short style; stigmas 2, capillary. Fruit beaked by the short persistent style, cordate-sagittate.

1. *P. torreyi* Wats. Stems slender, flat, 0.5 m. long or more, bearing the spathes in clusters along the upper part; leaves 4–8 cm. long, 1–2 mm. wide, thick and smooth; sheaths long, their margins membranous; spathes 3–5 in a cluster, 2–4 cm. long, slightly curved; appendages of the pistillate spadix elliptic, of the staminate oblong-ovate; fruit heart-shaped, 5 mm. long.

Growing on rocks which are uncovered at low tide. San Pedro; La Jolla.

Family 7. SCHEUCHZERIACEAE.

ARROW-GRASS FAMILY.

Marsh plants with rush-like or cylindric leaves. Flowers spicate, racemose or solitary, perfect or monoecious. Perianth none, 1-bracted or 4–6-parted. Stamens 1 or 3–6. Ovaries 1 or 3–6, when more than 1 they are more or less united while immature. Seeds anatropous; embryo straight.

Flowers perfect; perianth segments 3–6.

1. TRIGLOCHIN.

Flowers polygamous; perianth wanting.

2. LILAEA.

1. TRIGLOCHIN L. ARROW-GRASS.

Marsh plants with radical semiterete fleshy leaves, which have membranous sheaths at the base. Flowers small, perfect in spikes or racemes, on long smooth naked scapes. Perianth segments 3–6, concave, the 3 inner inserted higher up than the others when present. Stamens 3–6; anthers 2-celled, extrorse, sessile or nearly so, inserted at the base of the segments and deciduous with them. Ovaries 6, united or rarely free, 1-celled; style short; stigmas as many as ovaries, plumose. Fruit of

3-6 oblong or ovoid carpels, when ripe separating from the base upward from a persistent central axis, dehiscent by a ventral suture.

Carpels 6; fruit oblong or ovoid.

1. *T. maritima*.

Carpels 3; fruit globose.

2. *T. striata*.

1. ***T. maritima* L.** Perennial plants with a long rootstock and a thick caudex, which is usually covered with the sheaths of old leaves; spathes stout, 2-4 dm. high, commonly solitary; leaves much shorter than the scapes, tapering to a long acute or obtuse point, 4-6 mm. wide; racemes 4-10 cm. long; pedicels decurrent, 2-5 mm. long; perianth segments 6, the 3 inner smaller, ovate, greenish-white; stamens 6; ovaries 6, united, each 1-celled, 1-ovuled; carpels 3-angled, with the dorsal angles making a broad groove on the back, 5-6 mm. long; stigmas persistent and recurved.

Salt marshes along the coast.

2. ***T. striata* R. & P.** Perennial with upright or oblique rootstock; scapes slender, more or less angled, about 2 dm. high; leaves nearly as long as the scapes, fleshy, 2 mm. wide; flowers yellowish green; pedicels 2 mm. long or less, not elongating in fruit; perianth segments 3; stamens and carpels 3; fruit globose or obovoid, appearing 3-winged when dry; carpels rounded and 3-ribbed dorsally.

Salt marshes along the coast. Santa Cruz, Santa Barbara; not reported within our range but to be looked for.

2. **LILAEA** H. B. K.

Subaquatic stemless annuals, with simple slender scapes and radical leaves, which are slightly dilated at base. Flowers polygamous, the one sort solitary, pistillate and disposed among the leaves at the base, with long thread-like styles; the other monoecious, in dense spikes at the apex of slender scapes. Staminate flowers imbricated in narrow oblong spikes; anthers nearly sessile in the axis of a white linear petaloid bract. Pistillate flowers imbricated in conical crowded spikes, bractless, consisting of a 1-celled, 1-ovuled ovary; stigma capitate. Fruit ovoid, costate, indehiscent.

1. ***L. subulata* H. B. K.** Leaves cylindric, numerous, 12-20 cm. long, 3-5 mm. in diameter, tapering to a point at the apex; scapes 8-16 cm. high, shorter than the leaves, terete; styles of the solitary flowers often 12 cm. long and tipped with a capitate stigma; fruit 6 mm. long.

Occasional about San Bernardino, *Parish*. Frequent about San Diego and in the Cuyamaca Mountains; ranging from California to Chili.

Family 8. ALISMACEAE.

WATER-PLANTAIN FAMILY.

Aquatic or marsh plants, with scapose stems and radical long petioled sheathing leaves. Inflorescence racemose or paniculate. Flowers regular, perfect, monoecious or dioecious, pedicelled; the pedicels in whorls and subtended by bracts. Perianth segments 6, the outer 3 small, herbaceous, persistent; the inner 3 larger and petaloid, deciduous. Stamens 6 or more; anthers 2-celled, extrorse or dehiscent by lateral slits. Ovaries numerous, distinct, on a flat or convex receptacle, 1-celled, 1-ovuled. Carpels becoming achenes in fruit.

Carpels in 1 series; achenes verticillate.

1. ALISMA.

Carpels in several series; achenes capitate.

Flowers perfect.

2. ECHINODORUS.

Flowers polygamous or unisexual.

Lower flowers perfect, upper staminate.

3. LOPHOTOCARPUS.

Lower flowers pistillate, the upper usually staminate.

4. SAGITTARIA.

1. ALISMA L. WATER-PLANTAIN.

Perennial or rarely annual herbs, with erect or floating basal leaves, several-ribbed, these connected by transverse veinlets. Flowers numerous, in pyramidal panicles, on unequal 3-bracteolate pedicels. Petals white or rose tinged. Stamens 6-9; ovaries few to many, arranged in one whorl on a flat receptacle. Achenes 2-3-ribbed, curved on the back and 1-2-ribbed on the sides.

1. *A. plantago* L. Rootstock becoming bulbous by the sheathing bases of the petioles; leaves basal, elliptic-oblong, acute, 5-15 cm. long, tapering from the middle to each end, on petioles twice as long; scapes 4-8 dm. high, the whorled branches forming a loose pyramidal panicle; petals 2 mm. long, white; achenes strongly flattened, oblong, 2 mm. long, 15-25 in a whorl.

A widely distributed species ranging over both hemispheres. Not common in southern California, and known within our limits only at Cienega (*Moxley*).

2. ECHINODORUS Rich. BUR-HEAD.

Perennial or annual herbs with long-petioled, elliptic ovate or lanceolate, often cordate or sagittate leaves,

3-9-ribbed and mostly punctate with dots or lines. Scapes often longer than the leaves. Inflorescence racemose or paniculate. Flowers perfect, in whorls, each whorl with 3 outer bracts and numerous inner bracteoles. Petals white. Receptacle large, convex or globose. Stamens 12-30. Ovaries numerous; style obliquely apical, persistent; stigmas simple. Achenes more or less compressed, ribbed and beaked, forming spinose heads.

1. *E. cordifolius* (L.) Griseb. Leaves variable, usually broadly ovate, obtuse, cordate at the base, 12-16 cm. long and wide, sometimes lanceolate and smaller; petioles angular, striate, 5-15 cm. long; scapes 1 or more, erect 10-30 cm. high; flowers 3-6 in each whorl, on pedicels 6-12 mm. long; bracts linear-lanceolate, acuminate, dilated at the base; inner perianth segments shorter than the outer, 4-6 mm. long; stamens usually 12; styles exceeding the ovaries in length; fruiting heads bur-like, 4-6 mm. in diameter; achenes obovate or falcate, 6-8-ribbed; beak apical, oblique, 1.5 mm. long. (*E. rostratus* Engelm.)

Occasional along streams and banks of ponds. May-July.

3. LOPHOTOCARPUS Durand.

Annual aquatic or bog plants with basal long-petioled sagittate or cordate leaves, simple erect scapes bearing flowers in several verticils of 2-3 at the summit, the lower perfect, the upper staminate. Petals white. Sepals distinct, enclosing or enveloping the fruit. Receptacle strongly convex. Stamens 9-15, hypogynous, inserted at the base of the receptacle. Pistillate numerous with solitary ovules and an elongated persistent style. Achenes winged or crested; embryo horseshoe-shaped.

1. *L. calycinus* (Engelm.) J. G. Smith. Scapes weak, at length decumbent; leaves floating or ascending, entire, hastate or sagittate, the basal lobes spreading, ovate, acute or acuminate, 2-16 cm. long; verticils of flowers 1-5; bracts membranous, orbicular or ovate, or those of the staminate flowers lanceolate; pedicels recurved in fruit; petals 6-8 mm. long; filaments flattened, papillose; achenes obovate, 2 mm. long, narrowly winged on the margins, tipped with a short horizontal triangular beak. (*Sagittaria calycina* Engelm.)

Ballona Creek.

4. SAGITTARIA L. ARROW-HEAD.

Perennial aquatic or marsh herbs with tuber-bearing or nodose rootstocks. Leaves with nerves connected by numerous veinlets. Scapes erect, decumbent or floating.

Flowers monoecious or dioecious, borne near the summit of the scapes in whorls of 3's, pedicelled, the staminate usually uppermost, whorls 3-bracted. Perianth segments 6, the outer 3 herbaceous, persistent and reflexed or spreading in the pistillate flowers. Stamens numerous, inserted on the convex receptacle; anthers 2-celled, dehiscent by lateral slits. Pistillate flowers with numerous distinct 1-ovuled ovaries and small persistent stigmas. Achenes densely aggregated in globose heads, compressed; seeds curved; embryo horseshoe-shaped.

1. *S. latifolia* Willd. Rootstock slender; scapes 0.2–1 m. high, angled; leaves very variable, ovate-sagittate to linear, acute, lobes more or less divergent, acuminate; flowers monoecious with the lower verticils pistillate or dioecious, 2–4 mm. wide; petals white; stamens numerous, 25–35; filaments glabrous; pistillate pedicels shorter than the staminate; achenes broadly winged on both margins, 3 mm. long, with a lateral horizontal or curving beak, $\frac{1}{4}$ – $\frac{1}{3}$ its length. (*S. variabilis* Engelm.)

Occasional on margins of ponds about Los Angeles.

Family 9. POACEAE. GRASS FAMILY.

Annual or perennial herbs of various habit, rarely shrubs or trees. Stems (culms) generally hollow or sometimes solid, the nodes closed. Leaves sheathing, the sheaths usually split to the base on the side opposite the blade, a scarious or cartilaginous ring (ligule) borne at the base of the leaf-blade. Inflorescence spicate, racemose or paniculate, consisting of spikelets composed of 2–many 2-ranked imbricated bracts (glumes), the 2 lowest in the complete spikelet always empty, 1 or both sometimes wanting. One or more of the upper glumes usually contains in the axil a flower, which is usually inclosed by a bract-like awnless organ called the palea, placed opposite the glume with its back to the axis (rachilla) of the spikelet, generally 2-keeled. Flowers perfect or staminate, sometimes monoecious or dioecious, subtended by 1–3, usually 2 minute hyaline scales (lodicules) placed at the base of the ovary opposite the palea. Stamens 1–6, usually 3; anthers 2-celled, versatile,

longitudinally dehiscent. Ovary 1-celled, 1-ovuled; styles 1-3, usually 2 and lateral; stigmas hairy or plumose. Fruit a seed-like grain (caryopsis). Endosperm starchy.

KEY TO THE TRIBES.

- Spikelets 1-flowered or with a rudimentary or staminate flower below, rarely above, the perfect one; rachilla articulated below the empty glumes.
- Axis of inflorescence articulated; empty glumes firmer in texture than the flowering ones. Tribe 1. ANDROPOGONEAE.
- Axis of inflorescence not articulated; flowering glumes firmer in texture than the empty ones. Tribe 2. PANICEAE.
- Spikelets 1-many-flowered; rachilla usually articulated above the empty glumes.
- Spikelets 1-flowered.
- Spikelets arranged on one side of a continuous rachis forming a unilateral spike. Tribe 6. CHLORIDEAE.
- Spikelets not arranged in unilateral spikes.
- Inflorescence spicate; spikelets sessile on alternate notches of the rachis. Tribe 8. HORDEAE.
- Inflorescence racemose or paniculate, rarely spicate or apparently capitate; spikelets pedicellate.
- Glumes 5, the first 4 usually empty, the fifth with a hermaphrodite flower; palea 1-nerved. Tribe 3. PHALARIDEAE.
- Glumes 3 or sometimes 4, the first two empty; palea 2-nerved. Tribe 4. AGROSTIDEAE.
- Spikelets 2-many-flowered.
- Spikelets pedicellate in panicles or racemes, never unilateral.
- Empty glumes usually longer than the flowering glumes, 1 or more of the latter usually awned on the back or from beneath the teeth of the bifid apex; awn twisted. Tribe 5. AVENEAE.

Empty glumes generally shorter than the flowering glumes, these awnless or with 1-many terminal, rarely dorsal straight or simply divergent awns.

Tribe 7. FESTUCEAE.

Spikelets sessile in true spikes or on very short pedicels in unilateral racemes.

Spikelets in unilateral spikes or racemes.

Tribe 6. CHLORIDEAE.

Spikelets inserted on the alternate notches of the rachis forming equilateral, flattened or cylindric spikes.

Tribe 8. HORDEAE.

Tribe 1. ANDROPOGONEAE. SORGHUM TRIBE.

Spikelets in spike-like racemes, 2 at each joint of the rachis, 1 pedicellate and hermaphrodite, staminate or rudimentary. Glumes usually 4, the first and second empty, large and much firmer in texture than the others, the third usually empty or with a staminate flower in its axil, rarely awned, the fourth or flowering glume hyaline, usually awned, the awn generally twisted or geniculate.

Inflorescence composed of spike-like silky racemes. 1. ANDROPOGON.
Inflorescence paniculate; spikelets somewhat silky-pubescent. 2. HOLCUS.

1. ANDROPOGON L.

Slender or rather coarse perennials with solid culms. Spikelets heterogamous, in pairs at each joint of the articulate and usually hairy rachis, one of each pair sessile, hermaphrodite and 1-flowered, the other pedicellate and staminate or rudimentary. Glumes of the fertile spikelet 4, the first coriaceous, flattened on the back with a strong nerve near each margin and usually with fainter ones between, second glume hyaline, awned. Stamens 3. Styles distinct; stigmas plumose. Grain unfurrowed, free within the hardened outer glumes.

1. *A. glomeratus* (Walt.) B. S. P. Culms erect, 4-6 dm. high, smooth, simple below, much branched above, upper nodes of branches

barbed; sheaths compressed, glabrous or pubescent; leaves 2-4 mm. wide, scabrous, long acuminate, nearly equaling the culms, those of the culms 15-45 mm. long; branches elongated, forming a compact terminal inflorescence; spikes in pairs, about 25 mm. long, loose, protruding from the sides of the scabrous sheaths; rachis flexuous, the joints and pedicels pubescent with long spreading silky hairs; outer glume about 3 mm. long; awn 12-18 mm. long, scabrous; pedicelled spikelet reduced to a single scale or wanting. (*A. macrourus* Michx.)

Rubio and Eaton's Canyons, San Gabriel Mountains, *McClatchie*.

2. *A. barbinoidis* Lag. Culms erect, 4-10 dm. high, simple or branched, glabrous, the nodes pubescent with silky hairs; sheaths smooth; leaves 8-16 cm. long, 4-6 mm. broad, long-acuminate, scabrous, glaucous; ligule hairy; spikes 25-35 mm. long, in an exserted panicle, 5-10 cm. long; first glume of sessile spikelet ovate-lanceolate, 4 mm. long, about equaling the terminal hairs of the rachis joints, pubescent at base with long silky hairs, scabrous above; awn 10-15 mm. long, spiral, bent, scabrous; pedicelled spikelet reduced to a single narrow scale.

Occasional on stony south slopes in the chaparral belt. Sepulveda Canyon and Cahuenga Pass, Santa Monica Mountains; Tia Juana, San Diego County; Gaviota, Santa Barbara County; Santa Catalina Island.

2. HOLCUS L.

Annual or perennial grasses with long broad flat leaves and terminal ample panicles. Spikelets in pairs at the nodes, or in 3's at the ends of the branches, 1 sessile and perfect, the lateral pedicelled, staminate or empty. Sessile spikelet consisting of 4 glumes, the outer indurated and shining, obscurely nerved, the inner hyaline, the fourth awned and subtending a small palea and perfect flower, or palea wanting. Stamens 3. Styles distinct. Grain free.

1. *H. halepensis* L. (JOHNSON-GRASS.) Culms erect, 9-15 dm. high, simple or sometimes much branched, smooth; sheaths smooth; leaves 2 dm. long or more, 7-25 mm. wide, long-acuminate; panicle open, 15-45 cm. long; branches generally whorled, spreading, naked towards the base; outer glumes of sessile spikelet 4-6 mm. long, ovate-lanceolate, usually purplish, pubescent with long, appressed hairs; awn 8-16 mm. long, more or less bent, sometimes wanting; pedicelled spikelets of 4 glumes, the outer 2 about 6 mm. long, membranous, the inner 2 shorter and narrower, sometimes with staminate flowers. (*Sorghum halepense* Pers.)

Becoming a troublesome grass in moist places along roadsides and in fields. Especially common about Santa Ana.

Tribe 2. PANICEAE. MILLET TRIBE.

Spikelets hermaphrodite, terete or flattened on the back. Glumes 3-4, rarely 2, when 4 the third usually includes a staminate flower in its axil; flowering glume firmer in texture than the outer ones. Axis of the inflorescence not articulated, the rachilla being articulated below the empty glumes and the spikelets falling off singly from the pedicels.

Spikelets not surrounded by a bristly or spiny involucre.

Glumes 3; spikelets sessile or on short pedicels in unilateral spikes or racemes.

3. PASPALUM.

Glumes 4, the first usually short, rarely wanting. Spikes digitate.

4. DIGITARIA.

Spikes not digitate.

5. PANICUM.

Spikelets surrounded by a bristly or spiny involucre.

Bristles slender, not falling with the spikelets.

6. SETARIA.

Bristles thickened below, spine-like, falling with the spikelets.

7. CENCHRUS.

3. PASPALUM L. DITCH-GRASS.

Perennial grasses of various habit, with generally flat leaves and 1-flowered spikelets borne in 2-4 rows on 1-sided spikes, which are single, in pairs or panicle. Spikelets oblong to orbicular, flat on the inner surface, convex on the outer. Glumes 3, rarely 2 by the absence of the outermost, the outer ones membranous, the inner one indurated and subtending a palea and perfect flower. Stamens 3. Styles distinct; stigmas plumose. Ovary oblong or ovoid, smooth.

1. *P. distichum* L. Culms erect, 15-35 cm. high, creeping at the base; sheaths smooth, sometimes ciliate on the margins or sparsely pubescent; leaves flat, 4-10 cm. long, 2-4 mm. wide, smooth; spikes 25-50 mm. long, in pairs, or occasionally with a third, exserted; rachis flat, 1-2 mm. wide, smooth; spikelets 2.5-3 mm. long, elliptic, somewhat pubescent or glabrous, acute, nearly sessile in 2 rows; outer glumes 3-5-nerved, slightly exceeding the acute third one, which is sparingly bearded at the apex.

Frequent along streams and irrigating ditches. Los Angeles; Santa Ana.

4. DIGITARIA Scop. CRAB-GRASS.

Annual grasses with flat leaves. Spikelets borne in pairs or in 3's in secund spikes which are digitate or

approximate at the summit of the culm. Glumes 4 or 3, the innermost one chartaceous, subtending a palea of similar texture and a perfect flower. Stamens 3. Stigmas plumose.

1. *D. sanguinalis* (L.) Scop. Culms erect or decumbent, often rooting at the lower nodes, 3-9 dm. long, smooth; sheaths glabrous or pubescent; leaves 5-15 cm. long, 4-8 mm. wide, acuminate, glabrous or pubescent; spikes 3-10, narrowly linear, 4-15 cm. long, digitate at the summit of the culms; rachis flat, winged; spikelets 2.5-3 mm. long, in pairs, 1 sessile or nearly so, lanceolate; first glume minute, second a half to a third as long as the spikelet. (*Panicum sanguinale* L.)

Common along irrigating ditches and in neglected orchards and gardens.

5. PANICUM L. PANIC-GRASS.

Annual or perennial grasses, varying greatly in habit and inflorescence. Spikelets 1-2-flowered, when 2-flowered the lower one staminate only. Glumes 4, the 3 lower membranous, empty or the third with a staminate flower; the fourth chartaceous, shining, enclosing a palea of similar texture and a perfect flower. Awns commonly wanting. Stamens 3. Styles distinct; stigmas plumose. Grain free, enclosed in the hardened fruiting glume and palea.

Awns present.

1. *P. crus-galli*.

Awns wanting.

Sheaths glabrous.

2. *P. colonum*.

Sheaths pubescent.

Annual; panicle 20 cm. long or more.

3. *P. capillare*.

Perennial; panicle about 5 cm. long.

4. *P. pacificum*.

1. *P. crus-galli* L. Culms 3-8 dm. high, usually branching at base; sheaths smooth; leaves 1-5 dm. long, 3-12 mm. wide, smooth or scabrous; panicle composed of 5-15 sessile mostly erect or ascending branches; spikelets ovate, green or purple, densely crowded in 2-4 rows on one side of the rachis; second and third glumes about 3 mm. long, scabrous or hispid, the third glume more or less awned, empty, the fourth ovate abruptly pointed.

Frequent in neglected orchards and gardens and in waste places.

2. *P. colonum* L. Culms tufted, smooth, 2-6 dm. high, often decumbent and rooting at the lower nodes; sheaths compressed, usually crowded; ligule wanting; leaves flat, 3-15 cm. long, 2-8 mm. wide; panicles composed of 3-18, 1-sided more or less spreading dense branches, these 1-3 cm. long, spikelets single, or in 2's or 3's in 2 rows on one side of the hispidulous triangular rachis, obovate, pointed; first glume about half as long as the spikelet, 3-nerved, the

second and third glumes a little more than 2 mm. long, awnless, 5-nerved, hispid on the nerves, the fourth cuspidate.

Occasional along irrigating ditches and in waste places about Los Angeles and Santa Ana.

3. *P. capillare* L. Culms erect or decumbent, 3-6 dm. high, simple or sparingly branched; sheaths papillose-hirsute; leaves 15-30 cm. long, 6-15 mm. wide, more or less pubescent; terminal panicle usually 2-4 dm. long, lower branches exserted and widely spreading, 1-2 dm. long; spikelets 2-2.5 mm. long, acuminate; first glume $\frac{1}{4}$ - $\frac{1}{2}$ as long as the spikelet; second and third glumes nearly equal, acute, the fourth 1.5 mm. long.

Occasional along irrigating ditches and in neglected orchards and gardens.

4. *P. pacificum* Hitch. & Chase. Culms simple and erect, becoming profuse with age; sheaths hirsute to villous, often papillose; leaves usually rounded or truncate at the base, pubescent or glabrate, those of the culms 4-6 cm. long, those of the branches much shorter; terminal panicles less than 8 cm. long, ovoid, their branches ascending; lateral panicles much shorter, not exceeding the leaves; spikelets scarcely 2 mm. long, pubescent.

San Jacinto Mountains, *Hall*; Glenn Ranch, Lytle Creek Canyon.

6. *SETARIA* Beauv. BRISTLY FOXTAIL.

Annual or perennial grasses with erect culms, flat leaves, and dense cylindric or somewhat open bristly spike-like panicles. Spikelets hermaphrodite, usually 1-flowered. Glumes 4, the outer 3 membranous, the third often subtending a hyaline palea and rarely a staminate flower, the fourth or flowering glume chartaceous, smooth or transversely rugose, inclosing a palea similar in texture. Stamens 3. Styles distinct. Grain free, enclosed within the glume and palea.

1. *S. glauca* (L.) Beauv. An erect or ascending caespitose glaucous annual, 3-12 dm. high; culms branching at the base, compressed, glabrous; nodes smooth; sheaths glabrous; ligule short ciliate; leaves 5-15 cm. long, 4-8 mm. wide, long acuminate, nearly glabrous or scabrous on the upper surface and margins, generally pilose with scattered long hairs at the base; spikes about 1 cm. in diameter; rachis pubescent; setae 5-12 at each spikelet, unequal, yellowish, 3-8 mm. long; spikelets broadly ovate, 3 mm. long; palea convex at the base, concave above, transversely striate.

Occasional along streets in Los Angeles, *Davidson*.

2. *S. imberbis* (Poir.) R. & S. Perennial; culms erect or ascending, more or less caespitose, from creeping rootstocks, slender, compressed, scabrous below the panicle, otherwise smooth; sheaths glabrous, the lower much longer than the internodes, smooth on the hyaline margins; leaves 1-3 dm. long, 3-7 mm. wide, long

tapering to the apex, slightly scabrous on the upper surface and margins; spikes 2–5 cm. long, nearly 1 cm. broad; rachis angular, pubescent, branches short, 1- or rarely 2-flowered; setæ 8–12, spreading, 5–10 mm. long, unequal, slender, finely antrorsely scabrous; spikelets ovate, acute, 2–2.5 mm. long; first glume about $\frac{1}{3}$ – $\frac{2}{3}$ as long as the spikelet, ovate, acute, 5–7-nerved; third glume equaling the flowering glume, 5-nerved, subtending a broad palea of its own length; flowering glume elliptic-ovate, finely transversely rugose; palea plane or concave above.

Frequent along irrigating ditches. Los Angeles; Santa Ana; San Bernardino.

7. *CENCHRUS* L. BUR-GRASS.

Annual or perennial grasses with usually flat leaves and spike-like inflorescence. Spikelets subtended by a spiny involucre, which is deciduous at maturity with them. Glumes 4, the first hyaline, the second and third membranous, the latter sometimes subtending a palea and staminate flower, the fourth chartaceous, subtending a palea of similar texture which incloses a perfect flower. Stamens 3. Grain free, enclosed in the glume.

1. *C. tribuloides* L. Culms erect or decumbent from an annual root, usually robust, 15–45 cm. high, freely branching; sheaths generally very loose, compressed smooth; leaves 6–10 cm. long, 4–8 mm. wide; spikes 25–50 mm. long; involucre crowded on the scabrous rachis, globose, pubescent except at the base, spines stout; spikelets 2-flowered, about 6 mm. long.

Occasional in orchards and gardens. San Bernardino, *Parish*; Rialto. Native of Europe.

Tribe 3. PHALARIDEAE. CANARY-GRASS TRIBE.

Spikelets more or less laterally compressed, 1-flowered or rarely 3-flowered; glumes 5, the first 2 empty and below the articulation of the rachilla, the third and fourth above the articulation, usually empty or rarely subtending staminate flowers, very unlike the other ones, sometimes reduced to bristles, the fifth glume with a 1-nerved or nerveless palea and a hermaphrodite flower.

Represented with us by the single genus.

8. *PHALARIS*.

8. *PHALARIS* L. CANARY-GRASS.

Annual or perennial grasses with flat leaves and spike-like, capitate or narrowly paniculate inflorescence.

Spikelets crowded, 1-flowered. Glumes 5, the first and second about equal in length, strongly compressed laterally, usually wing-keeled, the third and fourth much smaller or rudimentary, fifth subtending a palea similar to itself and a perfect flower. Stamens 3. Styles distinct. Grain oblong, free, smooth, enclosed in the glumes.

1. *P. minor* Retz. Culms simple or somewhat branched, 4–10 dm. high, erect or decumbent at the base, smooth; sheaths usually shorter than the internodes, more or less inflated; ligule rounded, 2–6 mm. long; blades 5–15 cm. long, 4–10 mm. wide, smooth or faintly scabrous; spike 2–8 cm. long, dense; spikelets 5 mm. long; empty glumes more or less scabrous, 3-nerved, wing-keeled; third and fourth glumes subulate, hairy; fifth twice as long as the third and fourth, acuminate, pubescent with long appressed hairs.

Very common in all valleys in rather moist or heavy soil. March–May.

2. *P. lemmoni* Vasey. Culms rather slender, 3–10 dm. high, smooth; sheaths smooth; blades 3–5 cm. long, acuminate; ligule 6 mm. long; spike dense, nearly cylindric, sometimes slightly interrupted or lobed; empty glumes 4–5 mm. long, acute or acuminate; second pair about 1 mm. long; flowering glume lanceolate, acuminate, about equaling the empty glumes, pubescent; palea nearly as firm in texture as its glume and a little shorter.

Desiccated winter pools, Inglewood.

Tribe 4. AGROSTIDEAE. BENT-GRASS TRIBE.

Spikelets all hermaphrodite, 1-flowered, with 3 glumes, the first 2 empty or rarely wanting, usually exceeding or equaling the third or flowering glume in length; rachilla sometimes prolonged behind the palea into a naked or plumose bristle. Palea usually 2-nerved.

Flowering glumes awned or mucronate pointed.

Awn of flowering glume terminal or from between the teeth of the bifid apex, sometimes wanting in *Epicampes*.

Awns 3-branched.

9. *ARISTIDA*.

Awns simple.

Awns articulate with the glumes.

Awns usually long, geniculate and twisted below, persistent. 10. *STIPA*.

Awns short, caducous, or wanting.

15. *EPICAMPES*.

Awns not articulate with the glume. 11. *MUHLENBERGIA*.

Awn dorsal.

Spikelets articulated with the pedicel below the empty glumes.

16. *POLYPOGON*.

Spikelets not articulated below the empty glumes.

Empty glumes saccate at the base, several times larger than the flowering glumes; inflorescence spike-like.

18. GASTRIDIMUM.

Empty glumes not saccate, never exceeding the flowering glumes more than a third.

Empty glumes smooth or minutely scabrous along the keel.

17. AGROSTIS.

Empty glumes more or less hairy; inflorescence spike-like.

13. ALOPECURUS.

Flowering glumes awnless.

Pericarp free from the grain.

14. SPOROBOLUS.

Pericarp closely adherent to the grain.

Empty glumes abruptly awn-pointed.

12. PHLEUM.

Empty glumes not abruptly awn-pointed.

17. AGROSTIS.

9. ARISTIDA L. TRIPLE-AWNED GRASS.

Plants various in habit and inflorescence, with very narrow, often involute setaceous leaves. Spikelets narrow, 1-flowered. Glumes 3, narrow, the 2 empty ones carinate; the third rigid and convolute, bearing 3 awns, sometimes rudimentary or rarely wanting. Palea 2-nerved. Stamens 3. Styles distinct. Grain free, tightly enclosed in the glumes.

1. *A. bromoides* H. B. K. Culms slender, branching below and tufted, 8–35 cm. high; sheaths shorter than the internodes; ligule reduced to a short fringe; sterile shoots few, the leaves 2–8 cm. long, involute, setaceous, scabrid above; panicle exserted, spike-like, secund, purplish, 2–5 cm. long; spikelets on short pedicels; empty glumes narrow, linear, abruptly pointed, scabrous on the back, the first 3–5 mm. long, second 5–9 mm. long; flowering glume scabrous on the keel, about as long as the second glume; central awn shorter to a little longer than its glume, the lateral ones a little shorter, all scabrous; palea less than 1 mm. long.

Occasional in dry open places in the chaparral belt about Pasadena and San Diego; Catalina Island.

2. *A. purpurea* Nutt. Rather stout, tufted, glabrous, 3–6 dm. high; culms simple; sheaths longer than the internodes, pilose at the throat; leaves involute, the lower numerous, 3–10 cm. long, 1–2 mm. wide, those of the culm about 3, usually 3–4 cm. long; panicle purplish, the branches capillary, generally erect or ascending, usually many-flowered, 3–5 at each node; spikelets pale or purplish; second empty glume twice as long as the first, equaling the flowering glume, both cleft at the apex, the midnerve excurrent as a scabrous awn, 1–2 mm. long; flowering glume about 10 mm. long, strongly

tuberculate-scabrous; awns equal, 5–7 cm. long. (*A. purpurea californica* Vasey.)

Occasional in the lower altitudes of the chaparral belt.

10. STIPA L. FEATHER-GRASS.

Generally rather tall grasses with convolute, rarely flat leaves and paniculate inflorescence. Spikelets 1-flowered, narrow. Glumes 3, the outer 2 narrow, acute or rarely bearing an awn, the third rigid, convolute with a hairy callus at the base and bearing a more or less bent awn, which is spiral at the base and articulated to the glume. Stamens 3, rarely fewer. Styles short, distinct. Grain narrow, free, tightly enclosed in the glume. Awn villous or pubescent.

Awn with 1 bend, very villous below the bend.

1. *S. speciosa*.

Awn with 2 bends, villous to second bend.

2. *S. occidentalis*.

Awn scabrous or puberulent.

Floral glume clothed with hairs 4 mm. long.

Awn with 2 bends; plant 1 m. high.

3. *S. coronata*.

Awn with 1 bend; plant 5 dm. high.

4. *S. parishii*.

Floral glume with hairs 1 mm. long.

Terminal segment of awn 3.5 cm. long.

5. *S. setigera*.

Terminal segment of awn 2 cm. long.

6. *S. eminens*.

1. *S. speciosa* Trin. & Rupr. Perennial; culms tufted, erect, 2–5 dm. high; sheaths shorter than the internodes, the uppermost inflated; basal leaves half as long as the culms, scabrous, culm leaves, usually 3, 5–15 cm. long, closely involute; panicle often somewhat included, spike-like, 6–20 cm. long, the branches usually in pairs, bearing 1–3 spikelets; empty glumes nearly equal, hyaline, acuminate, about 16 mm. long; flowering glumes silky-pubescent, 8–12 mm. long, 2-toothed at the apex; awn 3–4 cm. long, geniculate below the middle, the twisted portion pilose with white hairs 3–6 mm. long.

Occasional on dry hillsides in the lower portions of the chaparral belt. San Fernando Valley; Elsinore; San Bernardino; San Diego.

2. *S. occidentalis* Thurb. Culms slender, cespitose, 3–6 dm. high; sheaths smooth; ligule 1 mm. long; blades narrow, involute; panicle narrow, 10–20 cm. long; glumes 8–10 mm. long, acuminate, 3-nerved, smooth; floral glume 6 mm. long, long-pilose, the callus sharp; awn about 25 mm. long, twice geniculate, pilose to the second bend or throughout, the first section 6–8 mm. long.

Open pine forests, Mt. Wilson. This is the *S. viridula* of the first edition.

3. *S. coronata* Thurb. Culms 10–20 dm. high, stout, 6–8 mm. thick at the base, lower culm leaves often 10 dm. long, 8–12 mm. wide at base, gradually tapering to a long involute point, the upper-

most about 15 cm. long, nearly filiform and rigid, all slightly scabrous on both surfaces and margins; ligule short; sheaths rather loose, the uppermost dilated, smooth except the margins, these ciliate, especially at the throat; panicle 3–5 dm. long, at length exserted and loose, narrow with erect branches; spikelets short-pedicelled; empty glumes acuminate and bristle-pointed, slightly scabrous on the nerves, the lower 16 mm. long, the upper 12 mm. long; flowering glume 10 mm. long, silky-pubescent; awn about 25 mm. long, slender, bent below the middle and minutely scabrous; palea about half the length of its glume; anthers naked.

Frequent on dry open ridges in the chaparral belt. Santa Monica, Santa Ana and San Gabriel Mountains; also in the foothills of San Diego County.

4. **S. parishii** Vasey. Culms tufted, leafy below, 3–4.5 dm. high, rather stout; sheaths smooth, longer than the internodes, the margins of the throat pubescent; blades involute, rigid, smooth below, scabrous above, the lower ones 12–18 cm. long, the upper 8–10 cm. long; panicle included at base by the somewhat inflated upper sheath, 12–15 cm. long, open; the lower branches in 3's, the upper in 2's or single, rather few-flowered; empty glumes linear-lanceolate, smooth, first 12–16 mm. long, second about 2 mm. shorter; flowering glume about 7 mm. long, silky with white hairs often 5 mm. long, 2-toothed; awn 16–20 mm. long, smooth below, scabrous above.

Occasional in the San Bernardino and San Jacinto Mountains, 5000–7000 feet altitude, *Parish, Hall*.

5. **S. setigera** Presl. Culms 3–9 dm. high, tufted, rather stout, pubescent at the nodes; sheaths hairy at the throat, the lower shorter than the internodes; basal leaves $\frac{1}{3}$ as long as the culms; culm-leaves flat, 4–6 mm. wide, the uppermost nearly equaling the panicle; ligule about 2 mm. long, truncate; panicle 10–25 cm. long, mostly included below, loose, flexuous, more or less secund when young, the slender branches in pairs; pedicels shorter than the spikelets; empty glumes 12–18 mm. long, long-acuminate; flowering glume 10 mm. long, silky-hairy on the nerves; awn geniculate above the middle, bent again, twisted and pubescent below, 6–10 cm. long; anthers bearded at the apex.

Common on the mesas, grassy hills, and in open places in the chaparral belt.

6. **S. eminens** Cav. Culms tufted, slender, 3–9 dm. high, pubescent at the nodes; leaves convolute-setaceous, basal ones about half as long as the culm, lower culm leaves 15–20 cm. long, the uppermost 5 cm. long; ligule very minute; sheaths striate, smooth; panicle 10–15 cm. long, exserted, somewhat secund, the very slender short rays in pairs, few-flowered; lower glumes about 10 mm. long, the upper 8 mm. long, acuminate, purplish; flowering glume 5–6 mm. long, pubescent; awn about 25 mm. long, slender, bent near the middle, minutely and evenly scabrous.

Occasional on dry ridges in the chaparral belt about Pasadena and San Diego.

6a. **S. eminens andersonii** Vasey. Culms and leaves more

slender; panicle thinner; empty glumes 6–8 mm. long; flowering glume 4 mm. long, nearly cylindric; awn 20–24 mm. long. Otherwise like the type.

Santa Monica Mountains, *Hasse*.

11. MUHLENBERGIA Schreb. DROP-SEED GRASS.

Perennial or annual grasses with convolute or flat leaves and paniculate inflorescence. Rootstocks often scaly. Spikelets 1–2-flowered. Glumes 3 or rarely 4; the outer ones empty, membranous or hyaline, acute and sometimes awned; the third 3–5-nerved, subtending a palea and perfect flower, obtuse, acute or produced into a capillary awn; stamens usually 3. Styles distinct. Callus minute. Grain narrow, free, tightly enclosed in the glume.

1. *M. parishii* Vasey. Culms spreading, diffusely branched, 4–8 dm. high; panicles terminating the long, leafy, terminal and lateral branches, 10–15 cm. long, its branches mostly alternate, the lower distant and subspicate; spikelets sessile and crowded on the branches; empty glumes membranous except the hispid green keel, equal, lanceolate, acuminate, scarcely 4 mm. long, somewhat exceeding the flowering glume; flowering glume about 3 mm. long, firm, scabrous, acute and terminating in a straight awn of about its own length, sparingly villous at the base; palea about equaling the glume, acute. (*M. sylvatica californica* Vasey.)

San Bernardino Mountains, *Parish*; near Pasadena, *Davidson*; San Diego.

2. *M. debilis* Trin. Culms tufted, decumbent at base and much branched, purplish throughout, 1–4 dm. high; leaves 25–50 mm. long, puberulent; ligule 1 mm. long, lacerate; panicle 5–12 cm. long, usually spreading, branches 25–35 mm. long, mostly single, sessile; spikelets 2–3 mm. long, short-pedicellate; empty glumes nearly equal, $\frac{1}{4}$ to $\frac{1}{2}$ as long as the flowering glume, mostly obtuse or eroded, hyaline; flowering glume slender, tapering, scabrous throughout, terminated by a slender awn 25–35 mm. long; palea about equal to the flowering glume.

Common on dry ridges and exposed places in the chaparral belt. Santa Monica, San Gabriel and Santa Ana Mountains, south to San Diego.

12. PHLEUM L. TIMOTHY.

Annual or perennial grasses with flat leaves and spike-like inflorescence. Spikelets 1-flowered. Glumes 3, the 2 outer empty, membranous, compressed keeled, the apex obliquely truncate, midnerve produced into an awn, the third much shorter and broader, hyaline, truncate denticulate at the apex. Palea narrow, hyaline.

Stamens 3. Styles distinct. Grain ovoid, free, enclosed in the glume and palea.

1. *P. pratense* L. Culms more or less tufted, erect, leafy, 3-9 dm. high, simple; sheaths smooth; blades minutely scabrous; spike about 6 mm. wide, 3-10 cm. long; empty glumes about 2 mm. long, hyaline except the 3 scabrous nerves; flowering glume nearly 2 mm. long.

Occasional in lawns, and in mountain meadows. Cuyamaca.

13. *ALOPECURUS* L. FOX-TAIL GRASS.

Annual or perennial grasses with erect or decumbent culms, usually flat leaves and spike-like inflorescence. Spikelets 1-flowered, flattened. Glumes 3; the 2 outer empty, acute, sometimes short-awned, more or less united below, compressed, keeled; keel ciliate or somewhat winged; third glume truncate or obtuse, hyaline, acute, sometimes wanting. Stamens 3. Styles distinct or rarely united at the base. Stigmas elongated.

1. *A. geniculatus* L. Perennial; culms decumbent and often rooting from the lower nodes, 2-4 dm. high, smooth; sheaths smooth, upper inflated; blades 1-3 mm. wide, the lowest often nearly equaling the culm, the uppermost equaling or exceeding the spike; spike 2-4 cm. long, about 4 mm. wide; spikelets 2-3 mm. long; empty glumes silky, obtuse; flowering glumes glabrous, their margins united to near the middle; awn about 4 mm. long, slender.

In low ground on the mesas near Inglewood, and in a similar location near San Diego. The only localities known in California.

14. *SPOROBOLUS* R. Br. DROP-SEED GRASS.

Perennial or annual grasses with flat or convolute leaves and open or contracted panicles. Spikelets usually small, 1-flowered, sometimes 2-3-flowered. Glumes in the 1-flowered spikelets 3, membranous; the 2 outer empty, the first somewhat the shorter; the third equaling or longer than the empty ones, enclosing a perfect flower and a 2-nerved palea. Stamens 2-3. Styles very short, distinct. Grain free.

1. *S. airoides* Torr. Perennial; culms erect, rather stout and tufted, 4-9 dm. high; sheaths somewhat shorter than the internodes, the throat ciliate; ligule very short; leaves convolute, tapering to a filiform apex, those of the culm 4-5, the upper filiform, 2-3 cm. long; panicle terminal, ovoid, often partly included at the base, 2-3 dm. long, its branches again branching and bearing scattered spikelets above the middle; spikelets light lead-color or brown;

empty glumes obovate, nerveless, first 0.5–1 mm. long, second 1.5–2 mm. long; flowering glume concave, broadly oval, 1-nerved, 2 mm. long; palea broader than its glume and a little shorter, truncate.

Occasional in low ground. Wilmington; Westminster; San Bernardino; San Diego.

2. *S. asperifolius* (Nees) Thurb. Culms branching, 2–4 dm. high, ascending from stout creeping rootstalks, sheaths smooth, loose, longer than the numerous short internodes, leaves flat, scabrous, 3–8 cm. long, 2 mm. wide; panicle included at the base, open, 9–18 cm. long, its branches scabrous, bearing single spikelets at the ends of very slender stiff branchlets; spikelets tinged with purple; empty glumes lanceolate, 3-nerved, first 0.3–0.5 mm. long, second slightly longer; flowering glume oval, obtuse, 1–1.5 mm. long; palea equaling the glume.

San Bernardino, *Parish*; Bear Valley, San Bernardino Mountains.

15. EPICAMPES Presl.

Tall perennial tufted grasses with usually very long spike-like panicles. Spikelets small, 1-flowered. Empty glumes 2, membranous, slightly unequal, convex on the back, carinate, often finely 3-nerved; flowering glumes 3-nerved, obtuse or emarginate, a little shorter or about equaling the empty glumes, usually tipped with a slender rather short awn. Stamens 3. Styles distinct, short; stigmas plumose. Grain free, included within the glumes.

1. *E. rigens* Benth. Perennial, tufted; culms rigid, erect, smooth, 5–10 dm. high; sheaths longer than the internodes, loose, smooth; ligule 4–6 mm. long; leaves scabrous, rigid, involute apex attenuate, 1–3 dm. long; panicle exserted or somewhat included, erect dense spike-like, 2–5 dm. long, 5–8 mm. broad; spikelets minutely scabrous, elliptic; empty glumes white, about 3 mm. long, nearly equal; flowering glume awnless, minutely pubescent, about 2 mm. long.

Frequent in the San Gabriel Mountains, in canyons, confined mostly to the upper portions of the chaparral belt.

16. POLYPOGON Desf. BEARD-GRASS.

Annual or rarely perennial grasses with decumbent or erect culms, flat leaves and spike-like panicles. Spikelets 1-flowered. Glumes 3; the outer 2 empty, each extended into an awn, the third smaller, usually hyaline, short-awned from below the apex, subtending a palea and perfect flower. Palea shorter than the glume. Stamens 1–3. Styles short, distinct. Grain free, enclosed in the glume and palea.

1. *P. monspeliensis* (L.) Desf. Annual; culms erect or geniculate, 2-5 dm. high; sheaths about equaling the nodes, the upper slightly inflated; leaves flat, scabrous; panicle spike-like, oval or cylindric, 3-8 cm. long, 1-2 cm. broad, pale, often yellowish-green; spikelets numerous, nearly concealed by the slender awns; empty glumes pubescent or ciliate, obtuse, elliptic; awns 4 mm. long; flowering glume 1 mm. long, hyaline, truncate-jagged; awn equaling or shorter than the glume or wanting; palea 2-toothed.

Common in low moist places along the coast and along streams throughout our range, ascending the mountains to the pine belt.

2. *P. littoralis* Sm. Perennial, 3-6 dm. high, ascending from rootstocks; sheaths nearly equaling the internodes, the upper slightly inflated; leaves flat, scabrous; panicle dense, somewhat lobed, 4-8 cm. long; spikelets 2-2.5 mm. long; awns equaling the empty elliptic glumes; flowering glume 1 mm. long, truncate, hyaline, its awn nearly twice as long; palea 2-toothed.

Occasional along streams in the valleys and foothills.

17. AGROSTIS L. BENT-GRASS.

Annual or perennial grasses with flat or bristle-like leaves and paniculate inflorescence. Spikelets 1-flowered. Glumes 3; the 2 outer empty, membranous, keeled, acute; the third shorter, obtuse, hyaline, sometimes bearing a dorsal awn, subtending a perfect flower. Palea shorter than the glume, sometimes minute or wanting. Stamens generally 3. Styles short, distinct. Grain free, enclosed in the glume.

Palea nearly equaling the glume.

1. *A. stolonifera*.

Palea obsolete.

Annual; flowering glume 1.5 mm. long.

2. *A. exarata*.

Perennial; flowering glume 2.5-3 mm. long.

3. *A. diegoensis*.

1. *A. stolonifera* L. Perennial from slender rootstocks; culms decumbent, 3-6 dm. high, often rooting from the lower nodes; sheaths inflated, smooth; leaves 5-10 cm. long, 2-6 mm. wide, scabrid above; panicle loosely contracted, 4-10 cm. long, 8-12 mm. wide; empty glumes nearly equal, obtuse, 1-nerved, scabrous; callus naked; flowering glume 1 mm. long, 5-toothed, glabrous; palea nearly equaling the glume.

Common along streams in the mountains and valleys throughout our range. Native of southern Europe.

2. *A. exarata* Trin. Annual; culms erect, tufted, leafy, 3-6 dm. high; sheaths minutely scabrid; leaves 7-15 cm. long, 3-5 mm. wide, scabrous; panicle interrupted, lobed and dense above, 10-15 cm. long; branches crowded, erect; spikelets 2.5-3 mm. long; empty glumes nearly equal, scabrous on the nerves; callus with a tuft of minute hairs at the base of each margin of the flowering glume; flowering glume 1.5 mm. long, glabrous, minutely 2-toothed at the apex, awnless; palea obsolete.

Occasional in low moist places in the coast valleys.

3. *A. diegoensis* Vasey. Perennial from slender stoloniferous rootstocks; culms erect, 4–8 dm. high; sheaths minutely scabrid; blades 6–15 cm. long, 2 mm. wide, scabrid; panicle lax, narrow, 6–14 cm. long, its branches erect; spikelets 3–4 mm. long; empty glumes nearly equal, scabrid; callus hairy at the base of each margin of the flowering glume; flowering glume 2.5–3 mm. long, scabrid especially on the margins, 4-toothed; palea obsolete.

Not known within our limits, but occasional in San Diego County and extending north to Washington.

18. *GASTRIDIDIUM* Beauv. NIT-GRASS.

Cæspitose annuals with flat leaves and shining spike-like panicles. Spikelets 1-flowered, hermaphrodite; rachilla prolonged behind the palea. Empty glumes 2, equal, enlarged or saccate at the base, keeled above; flowering glume much shorter than the empty ones, hyaline, truncate or obtusely 2-lobed, awnless or bearing a slender awn just below the apex. Palea narrow, about the length of the glume. Stamens 3. Styles short, distinct; stigmas plumose. Grain subglobose, free, included within the ventricose base of the glume.

1. *G. lendigerum* (L.) Gaud. Culms more or less tufted, erect, 15–60 cm. high; sheaths shorter than the internodes, smooth; leaves, 3–10 cm. long, 2–4 mm. wide, acuminate, scabrous; panicle spike-like, 5–10 cm. long, 1 cm. wide, pale green and shining; spikelets lanceolate, 5–6 mm. long; empty glumes scabrous above; flowering glume hairy, bearing a slender awn below the middle.

Common on dry ground in the chaparral belt throughout our range. Native of southern Europe.

Tribe 5. AVENEAE. OAT TRIBE.

Spikelets 2–several-flowered; outer empty glumes usually longer than the first flowering glume; 1 or more of the flowering glumes awned on the back or from between the teeth of the bifid apex; awn usually twisted or geniculate.

Spikelets articulated with the pedicels below the empty glumes.

Spikelets not articulate below the empty glumes.

Awns dorsal.

Spikelets small, less than 1 cm. long.

Spikelets 1 cm. long or more.

Awns terminal, rising from between the lobes or teeth.

19. *NOTHOLCUS*.

20. *DESCHAMPSIA*.

21. *AVENA*.

22. *DANTHONIA*.

19. **NOTHOLCUS** Nash. VELVET-GRASS.

Annual or perennial grasses with flat leaves and spike-like or open panicles. Spikelets deciduous, 2-flowered; lower flowers perfect, upper staminate. Glumes 4; the 2 lower empty, membranous, keeled, the first 1-nerved, the second 3-nerved and often short awned; flowering glumes chartaceous, the upper ones bearing a bent awn. Palea narrow, 2-keeled. Stamens 3. Styles distinct. Grain oblong, enclosed in the glume.

1. **N. lanatus** (L.) Nash. Densely and softly pubescent throughout; culms 4–6 dm. high, erect, often decumbent at the base, simple; sheaths shorter than the internodes; ligule 1–2 mm. long; leaves 3–8 cm. long, 4–10 mm. wide; spikelets 4 mm. long; empty glumes white-villous, the upper awn-pointed; flowering glumes 2 mm. long, smooth and shining, the lower sparsely ciliate on the keel, somewhat obtuse, the upper 2-toothed and bearing a hooked awn below the apex. (*Holcus lanatus* L.)

Santa Anita and Oak Knoll, *McClatchie, Davidson*.

20. **DESCHAMPSIA** Beauv. HAIR-GRASS.

Annual or perennial grasses with flat or convolute leaves and contracted or open panicles. Spikelets 2-flowered; both flowers perfect, the hairy rachilla extended beyond or rarely terminated by a staminate one. Glumes 4, the 2 outer empty, keeled, acute, membranous, shining, persistent; the flowering glumes similar in texture, deciduous, bearing a dorsal awn, toothed at the apex. Palea narrow. Stamens 3. Styles distinct. Grain oblong, free and enclosed in the glume.

1. **D. calycina** Presl. Annual; culms slender, 1–6 dm. high; sheaths smooth; leaves few, 3–6 cm. long, 1 mm. wide or less; panicle spreading, about $\frac{1}{3}$ the length of the culms, bearing 1–5 spikelets above the middle, the lowest of which are on spreading pedicels; spikelets 2-flowered; empty glumes about 7–8 mm. long, hairy below, shining above, 5-nerved, emarginate with 4 minute ciliate teeth; awn inserted below the middle, about 6 mm. long, bent near the middle and twisted below.

Occasional on dry mesas or in open places in the foothills and mountains.

2. **D. gracilis** Vasey. Annual; culms 3–6 dm. high; blades usually filiform; panicle open, 8–20 cm. long, the branches slender, rather densely flowered toward the end, naked below; glumes 4–6 mm. long, the lower 3-nerved.

San Gabriel, according to Hitchcock.

21. *AVENA* L. OAT.

Annual or perennial grasses with generally flat leaves and paniculate inflorescence. Spikelets 2—several-flowered or rarely 1-flowered; the lower flowers perfect, the upper usually staminate. Glumes 4—many, the 2 outer empty, somewhat unequal, membranous, persistent; flowering glumes deciduous, rounded on the back, acute, generally bearing a dorsal awn, apex often 2-toothed. Palea narrow, 2-toothed. Stamens 3. Styles short, distinct. Grain oblong, deeply furrowed, enclosed in the glume and palea, free or sometimes adherent to the latter.

1. *A. fatua* L. (WILD OAT.) Culms usually tufted, 5–15 dm. high; leaves scabrid, rather long and broad; panicle 1–4 dm. long, its branches unequal, long filiform; spikelets drooping, 2–3-flowered; empty glumes subequal, ovate-lanceolate, 20–25 mm. long, 9–11-nerved; flowering glumes 18 mm. long, acute, bifid, yellowish hairy especially below, 9-nerved; awn from near the middle of the glume, 1–2 cm. long, geniculate; palea 15 mm. long, hairy on the nerves.

Very common in all the valleys and on grassy hills. Native of southern Europe.

1a. *A. fatua glabrata* Peterm. (BASTARD OATS.) Like the type except that the flowering glumes are glabrous. In this respect resembling *A. sativa* L., the cultivated oat, but it is easily distinguished from that by its longer and geniculate awn and wide, 9-nerved flowering glume. *A. sativa* is awnless or has a short straight awn and a 7-nerved glabrous flowering glume.

Occasional in valleys. San Bernardino, *Parish*; Inglewood.

2. *A. barbata* Brot. Resembling *fatua*, but more slender, the spikelets smaller, mostly 2-flowered, the pedicels curved and capillary; floral glume, clothed with stiff red hairs, the teeth acuminate and ending in fine awns 4 mm. long.

Less common than the last, but widely distributed over the mesas and foothills of California. Best distinguished from *fatua* by the teeth of the floral glume which are merely acute and not awned in that species.

22. *DANTHONIA* DC. WILD OAT-GRASS.

Annual or perennial grasses with flat or convolute leaves and contracted or open panicles. Spikelets 3—many-flowered, the flowers all perfect or the upper staminate; rachilla pubescent extending beyond the flowers. Glumes 5—many, the 2 outer empty, keeled, acute, subequal, persistent, generally extending beyond the uppermost flowering glume; flowering glumes rounded on the

back, 2-toothed, deciduous; the awn arising from between the acute or awned teeth, flat and twisted at base, bent. Palea hyaline, 2-keeled near the margins, obtuse or 2-toothed. Stamens 3. Styles distinct. Grain free, enclosed in the glume.

1. **D. californica** Boland. Perennial, tufted; culms 4–8 dm. high, erect or somewhat decumbent at base; sheaths smooth, villous or bearded at the summit; blades flat or convolute, 10–15 cm. long, 3–5 mm. wide, scabrous; spikelets 1–5, terminal, 15–25 mm. long, usually purplish; pedicels slender, spreading, minutely hirsute; empty glumes equaling the spikelet; flowers usually 7; flowering glume about 8 mm. long, hairy on the callus and margins below the middle, teeth about 2 mm. long; awn about equaling the glume, scabrous.

In dry, usually stony ground. Newhall, *Davidson*.

Tribe 6. CHLORIDEAE. FINGER-GRASS TRIBE.

Spikelets 1-several-flowered in 1-sided spikes or racemes; the racemes digitate or fasciculate, rarely solitary; flowering glumes usually keeled, entire and unarmed or toothed and with 1–3 straight awns.

Spikes 2–6, digitate.

23. CYNODON.

Spikes not digitate.

Spikelets imbricated in 2 rows, forming unilateral spikes, which are scattered along a common rachis.

24. SPARTINA.

Spikes slender, alternating and more or less remote along a common axis.

25. LEPTOCHLOA.

23. CYNODON Pers. BERMUDA-GRASS.

Perennial mostly from running rootstocks, with short flat leaves and spicate inflorescence. Spikes digitate, slender. Spikelets 1-flowered, secund. Glumes 3; the 2 outer empty, keeled; the third broader membranous, compressed. Palea a little shorter than the flowering glume, hyaline 2-keeled. Stamens 3. Styles distinct. Grain free.

1. **C. dactylon** (L.) Pers. Culms 1–3 dm. high, erect, from long creeping and branching stolons, smooth; sheaths glabrous or somewhat hairy, crowded at the bases of the culms and along the stolons; ligule pilose; leaves 25–50 mm. long, 4–8 mm. wide, flat, rigid, smooth beneath, scabrous above; spikes 4–5, 12–25 mm. long, digitate; rachis flat; spikelets 2 mm. long; empty glumes hispid on the

keel, narrow, the first shorter than the second, about $\frac{2}{3}$ as long as the broad and strongly compressed third one.

Common along irrigation ditches and roadsides. Native of Europe. Commonly called Bermuda-grass and extensively used for lawns.

24. SPARTINA Schreb. CORD-GRASS.

Perennial glabrous grasses with long horizontal root-stocks, flat or involute leaves, and an inflorescence of 1-sided spreading or erect alternate spikes. Spikelets 1-flowered narrow, deciduous, borne in 2 rows on the rachis, articulated on very short pedicels below the glumes. Glumes 3; the outer 2 empty keeled very unequal, the third subtending a perfect flower, keeled, equaling or shorter than the second. Pales often larger than its glume, 2-nerved. Stamens 3. Styles filiform, elongated; stigmas filiform, papillose or shortly plumose. Grain free.

1. *S. glabra* Muhl. Culms simple, stout, 6–15 dm. high; sheaths glabrous, the lower ones crowded; leaves 5–7 dm. long, 1–1.5 cm. wide, usually flat, tapering to a long involute tip, smooth; panicles 2–4 dm. long, strict; spikes 5–15 cm. long; spikelets crowded, 10–14 mm. long; empty glumes glabrous or sparingly scabrous on the keel, the first 6–8 mm., the second 10–14 mm. long; flowering glume 8–10 mm. long; palea slightly exceeding the glume.

Occasional in the salt marshes along the coast. Wilmington.

2. *S. foliosa* Trin. Culms erect, 6–8 dm. high, stout; sheaths smooth, crowded at least above; leaves 2–3 dm. long, about 1 cm. wide, smooth, tapering to a long involute tip; panicle 10–15 cm. long, nearly cylindric; spikes 2–5 cm. long, appressed; spikelets crowded, 12–14 mm. long, glabrous or the empty glumes usually stoutly ciliate on the keels; the first empty glume narrow, 7–8 mm., the second 12–14 mm. long; flowering glume 10–12 mm. long, slightly shorter than the palea.

This has been found at San Diego and may occur within our limits. It is easily recognized by its dense spike-like inflorescence and leafy culms.

25. LEPTOCHLOA Beauv.

Mostly rather tall annual grasses with flat leaves and numerous spikes forming a simple panicle. Spikelets 2-many-flowered, flattened, alternating in 2 rows on one side of the rachis. Glumes 4-many, the 2 lower empty, keeled, 3-nerved. Palea 2-nerved. Stamens 3. Styles distinct. Grain free, enclosed in the scale and palea.

1. *L. filiformis* Beauv. Culms 3–9 dm. high, erect, branched, smooth; sheaths shorter than the internodes, smooth; ligule short,

lacerate-toothed; leaves 5–18 cm. long, 2–6 mm. wide, scabrous; spikes numerous, slender, rigid, ascending or sometimes spreading, the lower 5–15 cm. long; spikelets usually 3-flowered, about 2 mm. long; empty glumes shorter than the spikelets, acute, 1-nerved, slightly scabrous on the keel; flowering glumes 2-toothed at the apex, ciliate on the nerves.

Common in the San Joaquin Valley and at Imperial along irrigating canals. Known within our limits only from near Santa Monica, *Davidson*.

Tribe 7. FESTUCEAE. FESCUE TRIBE.

Spikelets 2–many-flowered, usually hermaphrodite, pedicellate in racemes or panicles, the latter sometimes dense and spike-like. Flowering glumes usually larger than the empty glumes, awnless or with 1–several straight, rarely bent, awns, which are either terminal or borne just below the apex.

Spikelets of 2 kinds in the same inflorescence,
hermaphrodite and sterile.

Fertile spikelets 2–3-flowered, awnless. 32. CYNOSURUS.

Fertile spikelets 1-flowered, long awned. 33. LAMARCKIA.

Spikelets all alike in the same inflorescence.

Plants dioecious, saline or maritime.

Spikelets solitary, concealed in the
axils of the crowded short and
rigid leaves. 26. MONANTHOCHLOE.

Spikelets in exserted spike-like panicles. 30. DISTICHLIS.

Plants not dioecious.

Flowering glumes 1–3-nerved or nerveless.

Annual; inflorescence a lax panicle. 27. ERAGROSTIS.

Perennial; inflorescence a spike-like panicle. 28. KOELERIA.

Flowering glumes 5–many-nerved.

Flowering glumes rounded on the back.

Nerves of the flowering glumes prominent. 29. MELICA.

Nerves of the flowering glumes obscure or manifest only near the apex.

Flowering glumes obtuse and awnless. 34. POA.

Flowering glumes acute, often awned.

Flowering glumes entire, acute or awned from the apex. 35. FESTUCA.

- Flowering glumes usually awned just below the entire or 2-toothed apex. 36. *BROMUS*.
- Flowering glumes compressed or keeled.
- Spikelets nearly sessile in dense 1-sided clusters at the ends of the few paniced branches. 31. *DACTYLIS*.
- Spikelets not in dense 1-sided clusters.
- Spikelets 1-2 cm. long; glumes short-awned. 36. *BROMUS*.
- Spikelets smaller; glumes awnless. 34. *POA*.

26. *MONANTHOCHLOE* Engelm.

A creeping or stoloniferous grass with stout rigid crowded leaves. Spikelets 2-3-flowered, unisexual, somewhat unlike, usually sessile in 4's and concealed within the leaf fascicles, the upper floral leaves becoming smaller, at length reduced to sheaths and resembling the outer glumes. Flowering glumes membranous, rigid, obtuse or denticulate. Palea 2-nerved, included within the flowering glume. Stamens in the staminate plants 3. Styles in the pistillate plants distinct, elongated; stigmas barbellate. Grain free, included within the glume and palea.

1. *M. littoralis* Engelm. Culms firm, creeping or ascending; leaves crowded, subulate, usually about 1 cm. long, conduplicate; flowering glumes 9-12-nerved.

Occasional on salt marshes along the coast. San Pedro; San Diego.

ARUNDO DONAX L. (GIANT-REED.) A tall reed-like grass with hollow culms, broad flat leaves and ample terminal panicles. Introduced from southern Europe and cultivated for ornament, sometimes found as an escape.

GYNERIUM ARGENTIUM Nees. (PAMPAS-GRASS.) Tall reed-like grass with solid culms, long narrow leaves and large showy plumose panicles. Introduced from South America and cultivated for ornament.

27. *ERAGROSTIS* Beauv.

Annual or perennial grasses with flat leaves and contracted or open panicles. Spikelets 2-many-flowered, more or less flattened. Glumes 4-many; the 2 outer

empty, unequal, shorter than the flowering ones, keeled, 1-nerved or the second 3-nerved; flowering glumes membranous, keeled, 3-nerved. Palea shorter than the glumes, prominently 2-nerved or 2-keeled, usually persisting on the rachilla after the glume has fallen. Stamens 2-3. Styles distinct, short. Grain free, loosely enclosed in the glume and palea.

1. *E. megastachya* Link. Culms 2-6 dm. high, erect or decumbent at base, usually branched, smooth; sheaths shorter than the internodes, sparingly pilose at the throat, otherwise smooth; blades 5-15 cm. long, 2-6 mm. wide, flat, smooth beneath, scabrous above; panicle 5-15 cm. long, the branches spreading or ascending, 2-4 cm. long; spikelets 8-35-flowered, 5-15 mm. long, about 3 mm. wide, flat; empty glumes obtuse, 2-2.5 mm. long, lateral nerves prominent.

Along ditches and streams about Los Angeles and Santa Ana.

2. *E. pilosa* (L.) Beauv. Annual, 4-5 dm. high, somewhat tufted, smooth; sheaths smooth, shorter than the internodes; leaves flat, 8-15 cm. long, smooth; panicle spreading, 15-30 cm. long; rays decomposed, smooth or slightly bearded in the axils; spikelets on pedicels 4-8 mm. long, narrowly linear, 5-8 mm. long, 7-20-flowered, dark lead color or purplish; empty glumes lanceolate, first 1.5 mm. long, second 2 mm. long, flowering glume ovate, 1.5-1.8 mm. long; palea about equaling its glume, scaberulous on the keel; grain 1 mm. long. (*E. orcuttiana* Vasey.)

Occasional along irrigating ditches about San Bernardino and Santa Ana.

28. KOELERIA Pers.

Tufted annual or perennial grasses with flat or setaceous leaves and mostly spike-like panicles. Spikelets 2-5-flowered. The 2 outer glumes empty, narrow, unequal, acute, keeled, scarious on the margins; flowering glumes 3-5-nerved. Palea hyaline, acute, 2-keeled. Stamens 3. Styles very short. Grain free, enclosed in the glume and palea.

1. *K. cristata* (L.) Pers. Perennial; culms erect, tufted, 3-7 dm. high; sheaths smooth, equaling or shorter than the internodes; basal leaves $\frac{1}{4}$ - $\frac{1}{2}$ as long as the culms, culm leaves 2-4, 6-12 cm. long, all glabrous; panicle spike-like, somewhat lobed and interrupted, 5-12 cm. long; axis and branches soft-pubescent; spikelets 2-4-flowered, 4-5 mm. long; first glume 2.5-3.5 mm. long, second 3-4 mm. long; flowering glume equaling the second empty one.

Common on grassy hills.

1a. *K. cristata pinetorum* Abrams. Closely resembling the type in habit and floral characters, but the sheaths and leaves soft-pubescent. (*K. cristata pubescens* Vasey.)

Occasional in open pine forests. Wilson's Peak; San Bernardino Mountains; San Jacinto Mountains.

29. *MELICA* L. MELIC-GRASS.

Perennial often tufted grasses with usually flat leaves and contracted or open panicles. Spikelets 1-several-flowered, often secund. The rachilla extended beyond the flowers and generally bearing 2-3 empty club-shaped or hooded glumes, convolute around each other. Two outer glumes empty, membranous, 3-5-nerved; flowering glumes larger, rounded on the back, 7-13-nerved, sometimes bearing an awn, the margins more or less scarious. Palea broad, shorter than the glume, 2-keeled. Stamens 3. Styles distinct. Grain free, enclosed in the palea and glume.

1. *M. imperfecta* Trin. Culms slender, somewhat tufted, 3-10 dm. high; sheaths exceeding the internodes; blades 6-7, flat or becoming involute, usually glabrous or more or less scabrous, 15-20 cm. long, about 2 mm. wide; panicle 2-3 dm. long, its branches in remote clusters, unequal, the longer 5-7 cm. long; spikelets scabrid, 1-flowered, with an imperfect flower or rarely 2-flowered; empty glumes ovate or nearly so, the first about 3 mm. long, 3-nerved, second slightly longer, 5-nerved; flowering glume about 4 mm. long, ovate, obtuse, 7-nerved, often purplish; palea nearly as long as its glume.

Common on grassy slopes on the mesas and grassy hills. March-May.

1a. *M. imperfecta flexuosa* Boland. Much resembling the type in habit and foliage, but the branches of the panicle few-flowered, generally in pairs, often reflexed; spikelets larger, acuter, paler and more coriaceous.

Santa Monica Mountains, *Davidson*.

1b. *M. imperfecta minor* Scribn. Usually densely tufted; culms compressed or angular; leaves mostly basal; branches of the panicles short, divergent or reflexed; spikelets smaller than in the species; the outer glumes shorter and more obtuse.

San Fernando Mountains, near Chatsworth Park.

1c. *M. imperfecta refracta* Thurb. Densely velvety-pubescent throughout; panicle slender, flexuous, its branches few, distant, strongly refracted; spikelets very acute.

Santa Monica, *Davidson*.

30. *DISTICHLIS* Raf. SALT-GRASS.

Dioecious grasses of saline or maritime habit with rigid culms, creeping or decumbent at the base, flat or convolute leaves and spike-like paniculate inflorescence. Spikelets flattened more on the staminate plants than on the pistillate. Two outer glumes empty, narrow, keeled,

acute; flowering glumes longer than the empty ones, many-nerved, acute, rigid; palea 2-keeled. Stamens 3. Styles thickened at the base, rather long, distinct. Grain free, enclosed in the glume and palea.

1. *D. spicata* (L.) Greene. (SALT-GRASS.) Culms rather stout, from creeping scaly rootstocks, rigid, erect, 1-5 dm. high; sheaths numerous, glabrous, bearded at the throat; blades pale green, 3-10 cm. long, 3 mm. wide at base, spreading, rigid, margins minutely ciliate; panicle spike-like, 3-8 cm. long, its branches appressed; spikelets 8-12 mm. long, keeled; empty glumes obtuse, first 2-3 mm. long, second 4 mm. long; flowering glume of sterile spikelets 3-5 mm. long, of fertile spikelets 5-6 mm. long.

Very common in low subsaline places along the coast and in interior valleys.

31. *DACTYLIS* L. ORCHARD-GRASS.

A tall perennial grass with flat leaves and paniculate inflorescence. Spikelets 3-5-flowered, short pedicelled, in dense capitate clusters. Flowers perfect or the upper staminate. The 2 outer empty glumes thin membranous, unequal, keeled, mucronate; flowering glumes larger than the empty ones, rigid, 5-nerved, keeled, the mid-nerve extended into a point or short awn. Palea shorter than the glume, 2-keeled. Stamens 3. Styles distinct. Grain free, enclosed in the glume and palea.

1. *D. glomerata* L. Culms 6-12 dm. high, tufted, erect, simple, smooth; sheaths shorter than the internodes, smooth or rough; ligule 2-4 mm. long; blades 7-20 cm. long, 2-6 mm. wide, flat, scabrous; panicle 7-18 cm. long, its branches spreading or ascending in flower, erect in fruit, the lower 25-60 mm. long; spikelets in dense capitate clusters, 3-5-flowered; empty glumes 1-3-nerved, the first shorter than the second; flowering glumes 4-6 mm. long, rough, pointed or short awned, ciliate on the keel.

Occasional in yards about Los Angeles.

32. *CYNOSURUS* L.

Annual or perennial tufted grasses with flat leaves and dense spike-like inflorescence. Spikelets consisting of narrow empty glumes with a continuous rachilla, the terminal spikelets of 2-4 broader glumes with articulate rachilla, and subtending perfect flowers. The 2 outer glumes broad, 1-3-nerved, pointed or short awned; upper glumes narrower, usually empty. Glumes of the sterile spikelets pectinate, spreading, linear-subulate;

1-nerved. Stamens 3. Styles distinct, short. Grain finally adherent to the palea.

1. *C. cristatus* L. Perennial; culms tufted, erect, slender, 3-6 dm. high; sheaths smooth, shorter than the internodes; blades of the culm flat, 2-10 cm. long, 1.5-3 mm. wide; spike nearly cylindric, oblong or linear, 3-10 cm. long; the clusters of spikelets all turned to one side, the empty ones forming involucre to each cluster.

On lawns, rarely seen. Los Angeles, *Davidson*. Native of Europe.

33. *LAMARCKIA* Moench.

A low annual grass with flat leaves and showy 1-sided panicles of crowded fasciculate spikelets, the fertile spikelets nearly enclosed by the numerous sterile ones. The terminal spikelet of each fascicle fertile, the others (1-3) linear and consisting of many distichously imbricated obtuse empty glumes. Fertile spikelets 1-flowered, with rachilla prolonged into a slender stipe and bearing a small empty awned glume or reduced to an awn. Empty glumes 2, 1-nerved, acuminate or short-awned, slightly unequal; flowering glume broader, 1-nerved, bearing a slender awn just below the apex. Palea narrow, 2-keeled. Stamens 3. Styles short, distinct; stigmas barbellate.

1. *L. aurea* (L.) Moench. (GOLDEN-TOP.) Annual; culms tufted, 2-5 dm. high; sheaths smooth; blades 5-8 mm. wide; panicle linear or oval, 5-8 cm. long; empty glumes of the fertile spikelets narrow, keeled, 4-4.5 mm. long; flowering glume 3 mm. long, oval, bearing a dorsal awn a little below the apex, 6-9 mm. long.

Common on grassy plains and hills. Native of southern Europe.

34. *POA* L. MEADOW-GRASS.

Annual or perennial grasses with flat or convolute leaves and contracted or open panicles. Spikelets 2-6-flowered, compressed, the rachilla usually glabrous. Flowers perfect or rarely dioecious. Glumes membranous, keeled; the 2 lower empty, 1-3-nerved; the flowering glumes longer than the empty ones, generally with a tuft of cobwebby hairs at the base, 5-nerved, the marginal nerves usually pubescent, often also the dorsal one. Palea a little shorter than the glumes, 2-nerved or 2-keeled. Stamens 3. Styles short, distinct. Grain free or sometimes adherent to the palea.

Annuals.

Sheaths smooth.

1. *P. annua*.

Sheaths scabrous.

2. *P. bigelovii*.

Perennials.

Sheaths smooth.

3. *P. pratensis*.

Sheaths scabrous.

Floral glume villous on keel and marginal nerves.

4. *P. fendleriana*.

Floral glume not villous, but pubescent below.

5. *P. scabrella*.

1. ***P. annua*** L. Annual; culms weak, compressed, 5–30 cm. long, decumbent; ligule 2–3 mm. long; blades of the sterile shoots $\frac{1}{2}$ – $\frac{2}{3}$ as long as the culms; culm leaves 3, flat; panicle subsecond, ovoid, 2–5 cm. long, its branches usually in pairs, the longest 2.5 cm. long, bearing spikelets above the middle; spikelets nearly sessile, 3–7-flowered, 4–6 mm. long; empty glumes compressed, about 2.5 mm. long; flowering glume ovate, smooth, erose at apex, 2.8–3.1 mm. long, with soft hairs on the keel and lower part of the lateral nerves; palea 2.5–2.8 mm. long, ciliate or pubescent on the keels.

Common in moist places in all our valleys. Native of Europe.

2. ***P. bigelovii*** Vasey & Scribn. Annual, with erect slender culms 1–4 dm. high; sheaths scabrous; panicle narrow, 7–15 cm. long, the branches short and appressed; spikelets ovate, 6 mm. long; empty glumes acuminate, 3-nerved, 4 mm. long; floral glume 4 mm. long, webbed at base, conspicuously pilose on the lower part of the lateral nerves and keel, and villous between on the lower part of back.

Los Angeles, *Davidson*, according to Hitchcock.

3. ***P. pratensis*** L. (KENTUCKY BLUE-GRASS.) Perennial; culms terete, glabrous, from running rootstocks, 3–6 dm. high; sheaths smooth; ligule truncate, 1.5 mm. long; leaves of the sterile shoots flat, abruptly concave-pointed, those of the culms 3, smooth or scabrous; panicle usually rather open pyramidal, its branches in half whorls of 3–6, densely flowered on the upper half; spikelets 3–6-flowered, 4–7 mm. long; empty glumes acute, scabrous on the keels, first 2.5–3 mm. long, second 3–3.5 mm. long; flowering glume webbed at the base, scabrous toward the apex, pubescent on the marginal nerves and on the keel below; palea linear, 2.5–3 mm. long, scabrous on the keels.

Frequent in lawns and occasional in mountain meadows. Bear Valley; Cuyamaca.

4. ***P. fendleriana*** (Steud.) Vasey. Perennial; culms tufted, 3–7 dm. high, usually dioecious; leaves of sterile shoots usually flat, 6–10 cm. long, 2 mm. wide, culm leaves 2–3, conduplicate, 1–10 cm. long; ligule 3–5 mm. long; panicle spike-like, 8–12 cm. long, its branches in 2's or 3's, flower-bearing on the upper half; spikelets ovate-lanceolate, flattish, often tinged with purple, 3–7-flowered; empty glumes nearly equal, compressed, 4–5 mm. long; flowering glume oblong, 4–5 mm. long, often denticulate at the apex, scabrous; palea lanceolate, scabrous, shorter than or equaling its glume.

Frequent on dry open hillsides in the chaparral belt.

5. *P. scabrella* (Thurb.) Benth. Perennial; culms slender, 4–7 dm. high, scabrid; leaves of the sterile shoots flat or conduplicate, 12–20 cm. long, 1–2 mm. wide, those of the culm 2–3, 5–7 cm. long; ligule 5–12 mm. long; panicle rather open or usually contracted, 12–15 cm. long, its branches in pairs, the longest 5–7 cm. long; spikelets 5–6 mm. long, 3–5-flowered; first empty glume 2.5 mm., the second 3 mm. long; flowering glume 3 mm. long, rough, hairy on the lower part of the nerves, apex denticulate; palea slightly shorter.

Occasional in the canyons of our coast mountains. Pasadena, Davidson; Santa Monica Mountains.

35. *FESTUCA* L. FESCUE-GRASS.

Mostly tufted perennial (ours annuals) grasses with flat or convolute leaves and paniculate inflorescence. Spikelets 2–several-flowered. The 2 lower glumes empty, more or less unequal, acute, keeled; flowering glumes membranous, narrow, rounded on the back, 5-nerved, usually acute and often awned at the apex. Palea scarcely shorter than the glume. Stamens 1–3. Styles very short, distinct. Grain glabrous, elongated, often adherent to the glume or palea.

Spikelets densely 5–13-flowered; flowering glumes without scarious margins.

1. *F. octoflora*.

Spikelets loosely 1–5-flowered; flowering glumes with narrow scarious margins.

Branches of the panicle or at least some of them divergent.

Flowers mostly 3–5 in a spikelet, only the principal panicle branches divergent.

Glumes both empty and flowering glabrous.

2. *F. pacifica*.

Glumes both empty and flowering hirsute.

3. *F. grayi*.

Flowers mostly 1–3 in a spikelet; all the spikelets divergent.

Glumes both empty and flowering glabrous.

4. *F. reflexa*.

Empty glumes glabrous; flowering glumes pubescent.

5. *F. microstachys*.

Branches of the panicle erect or appressed.

Lower empty glume $\frac{2}{3}$ – $\frac{3}{4}$ as long as the upper.

6. *F. bromoides*.

Lower empty glume not more than $\frac{1}{2}$ as long as the upper.

Flowering glume ciliate.

7. *F. megaleura*.

Flowering glume not ciliate.

8. *F. myuros*.

1. *F. octoflora* Walt. Annual; culms usually tufted, 15–30 cm. high; sheaths shorter than the internodes, smooth; culm-leaves 2–5,

erect, slender, 3–6 cm. long; panicle simple, erect, 5–10 cm. long, rather narrow; spikelets oval, 6–10 mm. long, 7–13-flowered; empty glumes involute, first 3 mm. long, second 4 mm. long; flowering glume involute, acuminate, scabrous, 3–4 mm. long; awn 1–7 mm. long; palea lanceolate, scarcely as long as the glume; stamens 2.

Frequent throughout the chaparral belt of all the hills and mountains.

1a. **F. octoflora hirtella** Piper. Distinguished by the usually low spreading tufts, usually pubescent foliage and more especially by the pubescent flowering glumes.

The most common form in southern California.

2. **F. pacifica** Piper. Culms slender, 2–5 dm. high; blades soft, glabrous, loosely involute; panicle 5–12 cm. long, the lower branches solitary, divaricate; spikelets 3–6-flowered; glumes glabrous, the first subulate-lanceolate, 1-nerved, 4 mm. long, the second lanceolate-acuminate, 3-nerved, 5 mm. long; flowering glumes lanceolate, scabrous (smooth in the lowest flower), 3–7 mm. long, attenuate into a scabrous awn 10–14 mm. long.

3. **F. grayi** (Abrams) Piper. General habit that of *pacifica*; blades and sheaths sometimes pubescent; spikelets 3–5-flowered; all the glumes pubescent.

Open gravelly situations; Cuimaca Mountains and mountains of Ventura County.

4. **F. reflexa** Buckl. Culms very slender, 2–4 dm. high, sheaths smooth or pubescent; blades narrowly linear; panicle 5–12 cm. long; the rays and the spikelets all at length divergent; spikelets 1–3-flowered, 5–7 mm. long; empty glumes glabrous, the first 2–4 mm. long, the second 2–5 mm. long; flowering glumes glabrous or somewhat scabrous, 5–6 mm. long, attenuate into a scabrous awn, usually 5–8 mm. long.

The most common species of this group in southern California, growing in dry situations in the foothills and on the mesas.

5. **F. microstachys** Nutt. Closely resembling *reflexa* in general habit and distinguished from it by the pubescent flowering glumes.

Occasional in the foothills about Los Angeles and Pasadena. This species was the first of the group to be described and the original specimens were collected near Los Angeles by Nuttall.

6. **F. bromoides** L. Culms 1–3 dm. high; sheaths and blades smooth; panicle dense, 5–10 cm. long; glumes unequal, the first 4 mm. long, the second 6–7 mm. long; flowering glume 7–8 mm. long, the awn 10–12 mm. long.

This and the two following species closely resemble each other in general habit and can not be distinguished in the field without close examination of the characters contrasted in the key. Much less common than the next, but it has been collected in San Bernardino and Santa Barbara Counties. Native of Europe.

7. **F. megaleura** Nutt. Annual; culms slender, smooth, mostly erect, 2–5 dm. high; sheaths smooth, longer than the internodes; culm-leaves 3–5, erect, slender, 5–10 cm. long; panicle narrow,

7-25 cm. long; branches scabrous, erect, appressed; spikelets 4-5-flowered, 8-10 mm. long; empty glumes glabrous, the first 2 mm. long or less, second involute, 4-6 mm. long; floral glume ciliate above the middle, awn 5-8 mm. long; palea lanceolate, scabrous on the keels, nearly equaling its glume, with 2 short awns.

Common on mesas and grassy hillsides, and along streets and waste places.

8. **F. myuros** L. Closely resembling the preceding species, but the floral glumes not ciliate.

Occasional in pastured land. Capistrano. Native of southern Europe.

36. **BROMUS** L. BROME-GRASS.

Annual or perennial grasses, with flat leaves and terminal panicles thickened at the summit. Spikelets few-many-flowered. The 2 lower glumes empty, unequal, acute; flowering glumes rounded on the back or sometimes compressed and keeled below the summit. Palea shorter than the glume, 2-keeled. Stamens generally 3. Stigmas sessile, inserted below a hairy cushion at the top of the ovary. Grain adherent to the palea. Annuals.

Awns evident, 4 mm. long or more.

Panicle open, the branches spreading.

Awn twisted and bent.

Awn not twisted and bent.

Sheaths smooth; awn 4-5 mm. long.

Sheaths pubescent, awn 30-50 mm. long.

Panicle contracted and dense.

Awns slender, 6-8 mm. long.

Awns stout, 16 mm. long or more.

Culms smooth.

Culms pubescent below the panicle.

Awn inconspicuous, about 2 mm. long.

Perennials.

Spikelets subterete.

Branches of spikelet stiffly divaricate; blades short.

Branches drooping; blades elongated.

Floral glume pubescent throughout.

Floral glume pubescent at margins and base only.

Spikelets strongly flattened.

Blades canescent and densely pilose, narrow or involute.

Blades not canescent, glabrous or somewhat pilose, broader and flat.

1. *B. trinii*.

2. *B. secalinus*.

5. *B. villosus*.

3. *B. hordeaceus*.

4. *B. madritensis*.

6. *B. rubens*.

7. *B. unioloides*.

8. *B. orcuttianus*.

9. *B. grandis*.

10. *B. laevipes*.

11. *B. subvelutinus*.

Awns less than 7 mm. long.

12. *B. marginatus*.

Awns more than 7 mm. long.

13. *B. carinatus*.

1. *B. trinii* Desv. Annual; culms 3–6 dm. high, often branched above, smooth or pubescent at the nodes; sheaths pilose-pubescent or nearly smooth; leaves 6–15 cm. long, 3–5 mm. wide, usually pilose-pubescent throughout or nearly smooth; panicle rather crowded and narrow, suberect, 8–20 cm. long; branches slender, ascending; spikelets lanceolate, 5–7-flowered, 1.5–2 cm. long; empty glumes lanceolate, acuminate, smooth, the first 1-nerved, 8–11 mm. long, the second broader, 3-nerved, 13–16 mm. long; flowering glume coarsely and rather sparsely pubescent, 5-nerved, 12–15 mm. long, acuminate, with 2 narrow teeth 2–3 mm. long; awn 15–20 mm. long, twisted below, bent below the middle. (*Trisetum barbatum* Steud.)

Occasional in the foothills and in the dry interior valleys. Pasadena; Santa Ana Mountains; San Bernardino; San Diego.

2. *B. secalinus* L. Annual; culms 3–7 dm. high, smooth throughout or somewhat pubescent on the nodes; sheaths smooth or sometimes sparsely pilose-pubescent; leaves 1–2 dm. long, coarsely and sparsely pubescent above, smooth beneath; panicle 8–18 cm. long, erect, the upper part drooping in fruit; spikelets ovoid-lanceolate, 10–18 mm. long, 6–8 mm. wide in fruit; empty glumes smooth, obtuse, the first 4–6 mm. long, 3–5-nerved, the second broader, 6–7 mm. long, 7-nerved; flowering glume 7-nerved, 6–8 mm. long, elliptic, obtuse, smooth or scabrous; awn undulate, 3–5 mm. long; palea equaling the glume.

Los Angeles River, *Davidson*.

3. *B. hordeaceus* L. Annual; culms erect, 2–8 dm. high, usually pubescent at the nodes; sheaths retrorsely soft pilose-pubescent; ligule 1.5–2 mm. long, lacinate; leaves linear, pilose-pubescent or nearly smooth, 5–15 cm. long, 3–5 mm. wide; panicle contracted, 5–14 cm. long, 2–4 cm. wide; spikelets 5–13-flowered, 12–15 mm. long, 4–6 mm. wide, ovate-lanceolate, becoming obtuse; empty glumes coarsely pilose or scabrous-pubescent, the lower 3–5-nerved, 4–6 mm. long, the upper 5–7-nerved, 7–8 mm. long; flowering glume 8–9 mm. long, coarsely pilose or scabrous-pubescent; awn rather stout, rough, straight or sometimes becoming twisted, 6–9 mm. long. (*B. mollis* L.)

Frequent along roadsides in coast valleys. Native of southern Europe.

4. *B. madritensis* L. Annual; culms 3–7 dm. high, smooth; sheaths smooth or the lower sparsely pubescent; ligule about 2 mm. long; leaves linear, puberulent or nearly smooth, 5–15 cm. long, 2–4 mm. wide; panicle erect, 5–12 cm. long, lower branches 2–4, 1–3 cm. long, unequal, spreading in flower, slender; spikelets 3–4 cm. long, nearly smooth or scabrous-puberulent, 7–11-flowered; empty glumes lanceolate, acuminate, the first 1-nerved, 9–12 mm. long, the second 3-nerved, 13–16 mm. long; flowering glume linear-lanceolate, 15–18 mm. long, glabrous or scabrous; awn stout, tapering, rough, somewhat curved, 16–22 mm. long; palea pectinate-ciliate on the keels, equaling the insertion of the awn.

Santa Ana Mountains, on the Santiago Peak trail, altitude 3000 feet.

5. *B. villosus gussonei* (Parl.) Asch. & Graebn. Annual; culms erect or ascending, 4-7 dm. high, smooth; sheaths pilose-pubescent; ligule 3-4 mm. long; leaves linear, 2-3 dm. long, 3-5 mm. wide, pilose on both sides; panicle somewhat drooping, secund, lax, 1-2 dm. long; lower branches 2-4, 3-5 cm. long; spikelets 5-7-flowered, 3.5-5 cm. long; empty glumes lanceolate, acuminate, smooth, the first 15-20 mm. long, 1-nerved, the second broader, 25-30 mm. long, 3-nerved; flowering glume 5-nerved, 25-30 mm. long, strongly scabrous, 2-toothed, teeth hyaline, 3-4 mm. long; awn stout, 3.5-4.5 cm. long, rough; palea somewhat shorter than its glume. (*B. maximus gussonei* Parl.)

Common along streets and in waste places, a troublesome pest.

6. *B. rubens* L. Annual; culms about 2-5 dm. high, erect, puberulent above; sheaths pubescent; ligule 1-2 mm. long, leaves 3-15 cm. long, pubescent on both sides; panicle erect, compact, usually purplish, 4-7 cm. long; spikelets mostly 7-11-flowered, 2-2.5 cm. long; empty glumes acuminate, pubescent or scabrous, the first narrow, 1-nerved, 7-9 mm. long, the second 3-nerved, 10-12 mm. long; flowering glume 13-16 mm. long, lanceolate, acute, 5-nerved, scabrous or appressed scabrous-pubescent, teeth 4-5 mm. long; awn 18-21 mm. long; palea long ciliate-pectinate on the keels.

Common in sandy soils along the coast and in interior valleys. Playa del Rey; Fullerton; Capistrano; San Bernardino.

7. *B. unioides* (Willd.) H. B. K. Annual; culms 5-10 dm. high, smooth; sheaths usually pilose-pubescent, sometimes smooth; ligule 3-4 mm. long; leaves linear, scabrous on both sides or sparingly pilose-pubescent; panicle erect or nearly so, 1.5-3.5 dm. long, its lower branches 2-4, short or on larger plants spreading or somewhat drooping; spikelets 2-3.5 cm. long, 5-9 mm. broad, 7-11-flowered; empty glumes broad, subacute, smooth or faintly scabrous, the first usually 5-nerved, 7-10 mm. long, the second 7-nerved, 10-13 mm. long; flowering glumes broadly lanceolate, acute, subcoriaceous, more or less scabrous, slightly 2-toothed at the apex, 13-16 mm. long; awn rarely exceeding 2 mm. in length; palea $\frac{1}{2}$ - $\frac{3}{4}$ the length of its glume.

Occasional along streets and irrigating ditches about Los Angeles; Fruitland.

8. *B. orcuttianus* Vasey. Perennial; culms erect, 8-12 dm. high, puberulent near the nodes, leafy below; sheaths glabrous or sparingly pilose-pubescent; ligule 1-2 mm. long; leaves smooth, broadly linear-lanceolate, 1-2 dm. long, 5-7 mm. wide; panicle erect or nearly so, 10-15 cm. long, its branches few, widely divaricate in fruit and rather rigid; spikelets 2-2.5 cm. long, 2-3 mm. broad, on short stout pedicels, terete, acuminate, 5-9-flowered; empty glumes smooth or scabrous, the first acute, 6-8 mm. long; the second broader, obtuse, 3-nerved, 8-10 mm. long; flowering glume 10-12 mm. long, obtuse, scabrous to scabrous-pubescent, 5-7-nerved, apex emarginate; awn about 5-7 mm. long; palea about equaling its glume.

Occasional in the San Gabriel and San Bernardino Mountains, in the upper altitudes of the chaparral belt; Santa Catalina.

9. *B. grandis* (Shear) Hitchc. Culms 1–1.5 m. high; sheaths pubescent; blades pubescent, elongated, spreading, rather lax; panicle broad, open, the branches slender and drooping, naked below, the lower usually in pairs, as much as 15 cm. long; first glume usually distinctly 3-nerved; floral glume densely pubescent over the back.

Monterey to San Diego County on mountain slopes; Little Santa Anita Cañon and Mt. Wilson.

10. *B. laevipes* Shear. Perennial; culms 6–13 dm. high, smooth; sheaths smooth below or sparsely pilose, pilose at the throat; ligule 1–2 mm. long; leaves linear-lanceolate, 15–25 cm. long, 5–12 mm. wide, usually scabrous above and glabrous beneath; panicle drooping, 15–25 cm. long; spikelets drooping, terete, acuminate, becoming oblong-lanceolate and compressed, 2–3 cm. long, 6–11-flowered; empty glumes smooth, the first acutish, 12–14 mm. long, the second 9–12 mm. long; flowering glume obtuse, 7-nerved, 12–15 mm. long, appressed ciliate-pubescent nearly to the apex; awn straight, 3–5 mm. long; palea slightly shorter than its glume.

Frequent on wooded slopes and in canyons in all the mountains and foothills.

11. *B. subvelutinus* Shear. Perennial; culms 3–6 dm. high; sheaths canescent; blades narrow, becoming involute, canescent and pilose; panicle 5–10 cm. long, narrow, erect, the branches short and erect; spikelets about 25 mm. long; glumes puberulent, the first 3–5-nerved, 8–10 mm. long, the second 7-nerved, 10–12 mm. long; floral glume appressed-puberulent, 12–14 mm. long; awn 3–4 mm. long.

This has been found in the mountains of Ventura and San Bernardino Counties and is to be expected in the San Gabriel Mountains.

12. *B. marginatus* Nees. Perennial; culms 6–12 dm. high, mostly puberulent to pubescent; sheaths pilose-pubescent; ligule 3–3.5 mm. long; leaves rather sparsely pilose-pubescent throughout and scabrous, 1.5–2.5 dm. long, 6–12 mm. wide; panicle erect, 1–2 dm. long, its lower branches 2–4, erect or spreading in flower, unequal, the lowest about 7 cm. long and bearing 2 spikelets; spikelets 2.5–4 cm. long, 5–7 mm. wide, laterally compressed, 7–9-flowered, erect or ascending; empty glumes scabrous to scabrous-pubescent, the first subacute, 3–5-nerved, 7–9 mm. long, second 5–7-nerved, 9–11 mm. long; flowering glume coarsely pubescent, acute, 11–14 mm. long, mostly 7-nerved, teeth very short, subacute; awn 4–7 mm. long; palea ciliate-pectinate on the keels, equaling its glume or nearly so.

Frequent in all the mountains in the pine belt and in the upper portions of the chaparral belt on wooded slopes.

13. *B. carinatus* H. & A. Annual or biennial; culm 5–8 dm. high, slightly pubescent at the nodes; sheaths retrorsely soft pilose; ligule 3–4 mm. long; leaves flat, mostly narrow, 1–2.5 dm. long, 3–6 mm. wide, sparsely pilose on both sides; panicle rather lax, 1–2.5 dm. long, lower branches 3, spreading or drooping; spikelets compressed, 2.5–3 cm. long, 5 mm. broad, 5–9-flowered; empty glumes lanceolate, acute, glabrous to slightly scabrous-pubescent, the first 3–5-nerved, 7–9 mm. long, second 5–7-nerved, 9–10 mm.

long; flowering glume puberulent or short pubescent, 7-nerved, 13-16 mm. long, shortly 2-toothed at apex and tapering into an awn 7-10 mm. long; palea nearly equaling its glume, ciliate-pectinate on the keels.

Rather common in grassy places in the lower hills and valleys. Verdugo Hills; Inglewood; San Bernardino.

13a. *B. carinatus californicus* (Nutt.) Shear. Sheaths and blades nearly smooth; flowering glumes merely scabrous, otherwise as in the type.

Occasional in the coast valleys. Ballona Creek near Mesmer.

Tribe 8. HORDEAE. BARLEY TRIBE.

Spikelets 1-flowered, usually hermaphrodite, sessile along the common rachis, forming a simple or compound spike. Glumes awned or awnless.

Spikelets solitary at each joint of the rachis.

Spikes very slender; spikelets 1-2-flowered. 38. LEPTURUS.

Spikes stout; spikelets usually 2- (or more) flowered.

Spikelets placed with one edge against the rachis.

37. LOLIUM.

Spikelets placed with one side against the rachis.

39. AGROPYRON.

Spikelets 2-3 at each joint of the rachis.

Spikelets 3 at each joint of the rachis.

40. HORDEUM.

Spikelets 2 at each joint of the rachis.

Axis of the spike continuous; empty glumes entire.

41. ELYMUS.

Axis of the spike articulate; empty glumes usually 2-many-cleft.

42. SITANION.

37. LOLIUM L. DARNEL or RYE-GRASS.

Annual or perennial grasses, with simple erect culms, flat leaves and terminal spikes. Spikelets several-flowered, solitary, sessile and alternate in the notches of the usually continuous rachis, compressed, the edge of the spikelet turned toward the rachis. Glumes rigid, the first in the lateral and the 2 lower in the terminal spikelets empty; flowering glumes rounded on the back, 5-7-flowered. Palea 2-keeled. Stamens 3. Styles distinct, very short; stigmas 2. Grain adherent to the palea.

Perennial; empty glume shorter than the spikelet.

Flowering glume awnless or with a very short awn; spikelets 5-11-flowered.

1. *L. perenne*.

Flowering glume awned; spikelets 15–30-flowered.

Annual; empty glume as long or longer than the spikelet.

2. *L. multiflorum*.

3. *L. temulentum*.

1. *L. perenne* L. (ENGLISH RYE-GRASS.) Perennial; culms 3–6 dm. high, erect or commonly geniculate at the base, smooth; sheaths smooth; leaves scabrid on the edges and upper side; spike 1–3 dm. long, bearing 6–10 spikelets; rachis smooth, channeled; spikelets 6–8 mm. long, smooth, shining, 7–11-flowered; empty glumes strongly ribbed, much shorter than the spikelet; flowering glume linear-oblong, terete, obtuse to shortly awned, ribbed.

Occasional in moist places along irrigating ditches and in low ground. Flowering the year round.

2. *L. multiflorum* Lam. (ITALIAN RYE-GRASS.) Perennial; spikes often purplish, somewhat curved; spikelets 15–30-flowered; flowering glumes usually with a short slender awn.

In similar locations and apparently more common than the preceding.

3. *L. temulentum* L. (DARNEL.) Annual; culms rather stout, 3–8 dm. high, smooth; sheaths smooth, usually somewhat exceeding the nodes; spikes stout, with 9–15 spikelets; spikelets 5–7-flowered; empty glumes not ribbed, equaling or usually exceeding the spikelets; flowering glume turgid, awnless or commonly with a straight awn 2 cm. long or less.

Occasional along roadsides and in grain fields.

38. LEPTURUS R. Br. HARD-GRASS.

Mostly low annual grasses, with narrow leaves and strict or curved elongated slender spikes; spikelets 1–2-flowered, sessile and single in alternate notches of the jointed rachis. Empty glumes 1–2, narrow, rigid, acute, 5-nerved; flowering glumes much shorter, hyaline, keeled, 1-sided to the rachis. Palea hyaline, 2-nerved. Stamens 3 or less. Styles short, distinct. Grain narrow, glabrous, free, enclosed in the glume.

1. *L. cylindricus* Trin. Culms slender, erect, straight, 2–4 dm. high, somewhat tufted, simple or commonly branched, smooth; sheaths smooth, much shorter than the internodes; leaves ascending, 1–2 mm. wide, 3–8 cm. long, smooth; spike green, 5–15 cm. long, straight; empty glume very acute, about 4 mm. long.

Occasional on borders of salt marshes toward the coast. Mesmer; Wilmington; Oceanside.

2. *L. incurvatus* (L.) Trin. Culms much branched, internodes more or less curved, more or less purplish throughout; spikes numerous, incurved; empty glumes 2, about 6 mm. long, narrow, acute.

Not known within our limits, but it occurs on the salt marshes at San Diego and about San Francisco.

39. AGROPYRON J. Gaertn. WHEAT-GRASS.

Annual or perennial grasses with flat or involute leaves and terminal spikes. Spikelets 3-many-flowered, sessile, single and alternate at each notch of the rachis, the sides of the spikelet turned toward the rachis. The lower glumes empty, narrower and usually shorter than the flowering glumes, acute or awned; flowering glumes rigid, rounded on the back, 5-7-nerved, usually acute or awned at the apex. Palea 2-keeled, the keels often ciliate. Stamens 3. Styles very short, distinct. Grain pubescent at the apex, usually adherent to the palea.

1. *A. parishii* Scribn. & Smith. Culms 5-10 dm. high, smooth, retrorsely pubescent on the nodes; sheaths pubescent below, sparingly ciliate on the margins, the lower shorter, the upper longer than the internodes; leaves smooth below, scabrous above and on the margins, the lower 1-2 dm. long, the uppermost 2.5-5 cm. long, 4-6 mm. wide at the somewhat constricted base, linear-attenuate; spike composed of 8-12 compressed ob lanceolate spikelets; spikelets 5-7-flowered, 16-20 mm. long, shorter than the internodes of the rachis, these scabrous on the margins; empty glumes $\frac{2}{3}$ as long as the spikelet, nearly equal, linear, acute or acuminate, 5-nerved, scarious on the margins; flowering glume lanceolate, acute, 9-11 mm. long, 5-nerved and scabrous above, minutely 3-toothed, awnless or awned; awn straight, slender, 6-8 mm. long; palea equalling its glume, acute or obtuse.

Occasional in the San Bernardino Mountains. First collected in Waterman's Canyon by S. B. Parish.

2. *A. laeve* (Scribn. & Smith.) Hitchc. Habit of the type, but nodes and sheaths glabrous; awns equalling or exceeding the glumes in length.

Ballona Creek, near Mesmer; Santa Ana Mountains; San Bernardino Mountains. First collected in the Cuyamaca Mountains by Palmer.

40. HORDEUM L. BARLEY-GRASS.

Annual or perennial grasses, with flat leaves and terminal cylindric spikes. Spikelets 1-flowered, usually in 3's at each joint of the rachis, the lateral generally short stalked and imperfect; rachilla produced beyond the flower. Empty glumes 2, all alike and subulate; flowering glumes narrow lanceolate, rounded on the back, rigid, persistent, obscurely 5-nerved above, usually awned. Palea nearly equalling the glume, 2-keeled. Stamens 3. Styles very short, distinct. Grain usually adherent to the glume, hairy at summit. Glumes not ciliate.

Glumes of fertile flowers dilated above the middle.

Glumes not dilated.

Glumes very scabrous.

Glumes glabrous or minutely scabrous.

Glumes at least some of them ciliate.

1. *H. pusillum*.

2. *H. nodosum*.

3. *H. gussoneanum*.

4. *H. murinum*.

1. *H. pusillum* Nutt. Annual; culms 1-4 dm. high; blades erect, flat; spike erect, 2.5-7.5 cm. long, 10-14 mm. wide; the first glume of the sterile lateral pairs of spikelets and both of the fertile spikelet dilated above the base, attenuate into a slender awn 8-14 mm. long; glumes very scabrous; floral glume not awned.

In low heavy usually saline ground; Santa Catalina and San Diego.

2. *H. nodosum* L. Perennial; culms erect, slender, 2-6 dm. high, sheaths glabrous; leaves often deflexed, flat, scabrous, 5-8 mm. wide; spike slender, compressed, usually nodding, 6-10 cm. long, 8-10 mm. wide; rachis very brittle; lateral spikelets awnless, staminate or neutral; flower of central spikelet sessile; empty glumes not flattened or dilated above the base, all alike and subulate; flowering glume including its awn 14-18 mm. long; awn usually brownish or purplish.

Frequent in moist places in all our valleys.

3. *H. gussoneanum* Parl. Annual, rather glaucous; culms more or less decumbent at base, tufted, 1-2 dm. high; spikes 2-4 cm. long, rather pale; lateral spikelets neutral or sometimes staminate, their inner empty glumes narrowly flattened, 0.5 mm. wide; fertile flower sessile.

Occasional along the coast marshes.

4. *H. murinum* L. Annual; culms tufted, decumbent at base, 2-5 dm. high; upper sheaths smooth, scarious on the margins, often dilated, the lower pilose; leaves softly pubescent and scabrous; spikes stout, compressed, 5-10 cm. long; central spikelet pedicelled; empty glumes lanceolate, flat, ciliate; awns 18-24 mm. long; outer empty glumes of lateral spikelets similar, the inner awn-like and not ciliate; flowering glume about 12 mm. long, scabrous above; awn 2-5 cm. long; flowering glumes of the lateral spikelets smaller; awn 15-40 mm. long; palea ciliate on the keels.

A very common and troublesome grass especially in pastured land. Commonly called Fox-tail.

41. ELYMUS L. WILD RYE.

Mostly erect rather tall grasses with flat leaves and closely flowered terminal spikes. Spikelets 2-6-flowered, the uppermost imperfect, sessile, in 2's, rarely in 3's or 4's at the alternate notches of the continuous or articulate rachis; rachilla articulate above the empty glumes and between the flowers. Empty glumes 2, nearly equal, rigid, narrow, 1-3-nerved, acute or awn-pointed,

persistent, and subtending the flowers like an involucre; flowering glumes shorter, rounded on the back, obscurely 5-nerved, obtuse, acute or awned from the apex. Palea a little shorter than the glume, 2-keeled. Stamens 3. Styles short, distinct. Grains adherent to the glumes and palea, hairy at the summit.

Glumes subulate, nearly or quite nerveless.

Tall stout reed-like plants; spikes dense.

Slender plants with slender spikes.

Glumes lanceolate, distinctly nerved.

1. *E. condensatus*.

2. *E. triticoides*.

3. *E. glaucus*.

1. *E. condensatus* Presl. Culms stout, from stout creeping rootstocks, 10–25 dm. high; sheaths smooth; ligule 2–4 mm. long; leaves 3–5 dm. long, 25 mm. wide or less at the base, long acuminate, smooth or nearly so toward the base, becoming scabrous toward the apex, flat, the edges somewhat involute above; spike rather dense and ample or somewhat lobed, 2–5 dm. long, erect; spikelets imbricated in 2's or 3's or more, 4–5-flowered; empty glumes subulate, scabrid, about 12 mm. long; flowering glumes scabrous below, 11 mm. long, 3 mm. wide, 7-nerved; palea equaling the glume, scabrous and ciliate on the keels above.

Frequent in canyons and in somewhat moist places on all the hills and in the chaparral belt of the mountains.

2. *E. triticoides* (Nutt.) Buckley. Culms rather slender, smooth and usually glaucous, from slender rootstocks, 6–10 dm. high; sheaths smooth; ligule a ciliate ring; leaves 15–30 cm. long, 5–8 mm. wide, scabrous on the margins and nerves above; spike 9–18 cm. long, about 1 cm. wide or less; rachis puberulent and with a narrow ciliate wing; spikelets in 2's or 3's, rather distant below, crowded in the middle, often single above, 4–6-flowered; empty glumes 8–10 mm. long, subulate, scabrous on the nerves above; flowering glumes 6–10 mm. long, 3 mm. wide, 9-nerved, glabrous; palea about equaling its glume, scabrous on the keels. *E. orcuttianus* Vasey.

Common in low ground, especially in the coast valleys.

3. *E. glaucus* Buckl. Culms erect and tufted, from stoloniferous rootstocks, 6–10 dm. high, smooth; sheaths smooth or minutely scabrid; ligule about 0.5 mm. long, entire; leaves flat, scabrid on both sides, 6–10 mm. wide, the lowest about 2 dm. long; spike linear, erect, 6–15 cm. long, 5–8 mm. wide; spikelets usually in 2's, sometimes in 3's, 3–4-flowered; empty glumes 8–12 mm. long; awn-pointed, scabrid on the 2–4 prominent nerves; flowering glumes scabrid above, 9–12 mm. long, tapering into a straight awn 7–14 mm. long; palea scabrid, 9–10 mm. long, emarginate; rachis scabrid on the margins.

Frequent in open shady places in the upper portions of the chaparral belt and in the pine belt. San Gabriel and Santa Ana Mountains. June–July.

3a. *E. glaucus jepsoni* Davy. Closely resembling the typical form, but the sheaths more or less pubescent.

The more common form in open pine forests, and ranging northward to northern California.

42. SITANION Rafin.

Cæspitose perennials, with usually flat leaves and bearded spikes. Spikelets usually 2 (1-3) at each joint of the articulate rachis of the spike, 2-several-flowered. Empty glumes 2 or sometimes 3, many-parted from near the base or bifid or subulate and entire, awned; flowering glumes terminating in a single awn or trifold or 3-awned. Palea as long as its glume, entire, bidentate or 2-awned. Stamens 3. Styles short. Grain adherent to its glume and palea, hairy at the summit.

Empty glumes deeply cleft into 3-11 or more
setaceous awns.

1. *S. jubatum*.

Empty glumes bifid above the middle or all entire
and subulate or setaceous.

Glumes 2-nerved.

2. *S. californicum*.

Glumes or some of them 3-nerved.

3. *S. hansenii*.

1. *S. jubatum* J. G. Smith. Culms erect, 6-9 dm. high, smooth; lower sheaths hirsute, the upper minutely pubescent or sparsely hirsute, becoming smooth; ligule 1 mm. long; leaves 10-18 cm. long, 3-5 mm. wide, strigose-pubescent throughout and sparsely hirsute above, midnerve prominent beneath; spike 1-2 dm. long, densely flowered; empty glumes 4, 3-many-parted from about the middle, the lobes setaceous, mostly 8-10 cm. long; spikelets 2-4-flowered, the second hermaphrodite, the other sterile or the upper staminate; flowering glume linear-lanceolate, 8-10 mm. long, smooth below, sparsely scabrous above, 5-nerved, trifold at the apex, lateral lobes setaceous, the middle prolonged into a slender scabrous awn, 8-12 cm. long; internodes of the rachis 5-7 mm. long, glabrous. (*S. multisetum* J. G. Smith.)

Rather common on mesas and grassy hills. March-May.

2. *S. californicum* J. G. Smith. Culms tufted, ascending, 1.5-2.5 dm. high, rather densely pubescent above; lower sheaths densely hirsute, the upper minutely puberulent; ligule obsolete; leaves 2-8 cm. long, 3-4 mm. wide, scabrous above and on the margins, densely puberulent on the back; spike rather loosely flowered, 5-8 cm. long; lowest flower of one or both spikelets sterile; empty glumes 4, entire, 3-5 cm. long; flowering glume linear, 10-12 mm. long, finely scabrous, awn stout, about 4 cm. long; palea 2 mm. shorter than its glume, scabrous on the nerves below; internodes of the rachis 4-5 mm. long, scabrous throughout.

Rather common in open pine woods in the San Gabriel and San Bernardino Mountains. June-August. Another closely related species, *S. glabrum* J. G. Smith, is frequent in the San Jacinto and Cuyamaca Mountains. It is readily distinguished by the glabrous culms and sheaths.

3. *S. hanseni* J. G. Smith. Culms erect, scarcely or not at all tufted, 5–6 dm. high, smooth; sheaths smooth or the lower sparsely hirsute, ciliate on the margins, shorter than the internodes; ligule 1 mm. long; leaves 4–12 cm. long, 3–4 mm. wide, scabrous throughout; spike rather loosely flowered, 1–1.5 dm. long, reddish; spikelets 4-flowered; empty glumes lanceolate, entire, those of the lowest spikelets bifid above the middle with short awn 1–4 cm. long; flowering glumes 10 mm. long, linear-lanceolate, smooth below, scabrous above, 3-awned; lateral awns 1–2 mm. long, the middle one erect, 3–4.5 cm. long; palea shorter than its glume, scabrous on the margins. (*S. anomalum* J. G. Smith.)

Near Pasadena *Allen*. Ballona Creek, near Mesmer, and on the South Fork of the Santiago Creek, Santa Ana Mountains.

Family 10. CYPERACEAE. SEDGE FAMILY.

Grass-like or rush-like annual or perennial herbs from fibrous roots or running rootstocks. Stems slender, solid, triangular, quadrangular, terete or flattened. Leaves narrow, with closed sheaths. Flowers perfect or imperfect, 1 or rarely 2 in the axil of each scale, and arranged in spikes. Spikes solitary or clustered, 1–many-flowered. Scales 2-ranked or spirally imbricated, persistent or deciduous. Perianth hypogynous, composed of bristles or interior scales, rarely calyx-like, or wanting. Stamens 1–3, rarely more; filaments slender or filiform; anthers 2-celled, longitudinally dehiscent. Ovary 1-celled, sessile or stipitate; ovule 1, anatropous, erect; style 2–3-cleft or rarely simple or 2-toothed. Fruit a lenticular plano-convex or trigonous achene. Endosperm mealy. Embryo minute.

Flowers perfect.

Scales 2-ranked.

Spikelets flattened; perianth none.

1. CYPERUS.

Spikelets scarcely flattened; perianth of 3–6 bristles.

5. SCHOENUS.

Scales spirally imbricated.

Styles not dilated at base.

2. SCIRPUS.

Styles dilated at base.

Spikelets solitary, terminal, bractless.

3. ELEOCHARIS.

Spikelets in umbels, involucrate.

4. FIMBRISTYLIS.

Spikelets polygamous; scales spirally imbricated, only the terminal perfect.

6. CLADIUM.

Flowers monoecious or dioecious; pistillate enclosed in a sac-like perigynium.

7. CAREX.

1. CYPERUS L. GALINGALE.

Annual or perennial herbs. Stems mostly simple, triangular, leafy near the base and with 1 or more involucre leaves at the base of the simple or compound, umbellate or capitate inflorescence. Rays of the umbel sheathed at the base, usually very unequal. Spikelets flat or nearly terete, composed of few-many persistent or deciduous scales, these concave, conduplicate or keeled, 2-ranked, all flower-bearing or the lower empty. Flowers perfect. Perianth none. Stamens 1-3. Styles 2-3-cleft, deciduous from the summit of the lenticular or 3-angled achene.

Styles 2-cleft; achenes lenticular; rachis wingless.

Annuals; scales folded and sharply carinate; achenes little flattened.

Scales obtuse, dark brown; achenes oblong.

1. *C. melanostachys*.

Scales acute, yellow brown; achenes ovate.

2. *C. bromoides*.

Perennial from a wiry rootstock; achenes biconvex.

3. *C. laevigatus*.

Styles 3-cleft; achenes 3-angled.

Scales with setaceous recurved tips.

4. *C. inflexus*.

Scales merely acute or obtuse.

Spikelets flattened, their scales falling away at maturity from the persistent rachis.

Perennial by tuber-bearing rootstock; wings persistent, attached to the rachis for their whole length.

5. *C. esculentus*.

Annual; wings scarious, soon separating from the rachis to the base.

6. *C. parishii*.

Spikelets subterete, falling away with the scales attached at maturity.

Spikes oblong, compact; spikelets slender.

7. *C. speciosus*.

Spikes short, loose and spreading; spikelets broader.

8. *C. longispicatus*.

1. *C. melanostachys* H. B. K. Stems tufted, slender, 1-4 dm. high; leaves about 2 mm. wide, those of the involucre 1-2, elongated; spikelets sessile in a capitate cluster, appearing somewhat lateral, 6-10 mm. long, linear-oblong; scales ovate, obtuse, 2 mm. long, dark brown with pale or green keel; stamens 2 or 3; style 2-cleft, scarcely exerted; achene lenticular, oblong, somewhat pointed, dull. (*C. diandrus capitatus* Britton.)

Common in moist sandy places on river bottoms below 1500 feet. Los Angeles; San Bernardino.

2. *C. bromoides* (Clarke) Britton. Annual with slender stems 4–8 dm. high, exceeding the leaves; spikelets 4–12, lanceolate, flattened, 10–20-flowered; involucre leaves 2–4; scales acute, 4 mm. long, yellowish brown, green on the 3-nerved keel, scarious-margined; stamens 3; styles 2-cleft; achenes ovoid, black, 1–1.5 mm. long, lenticular.

Cienega, near Los Angeles according to Parish.

3. *C. laevigatus* L. Perennial, with slender creeping rhizomes; stems tufted, slender, 8–15 cm. high, terete, with 2–3 short brown sheaths at the base, the upper bearing a short, erect, subtriangular leaf, otherwise naked; involucre of usually 2 leaf-like bracts, 1 a continuation of the stem, erect, the other spreading, 3 cm. long or less; umbel sessile, capitate, apparently lateral; spikelets sessile, many-flowered, 4–6 mm. long, pale green; scales broad, obtuse, about 2 mm. long; rachis deeply pitted transversely; stamens 3; style 2-cleft; achene broadly obovate, 12 mm. long.

Occasional in moist places about Los Angeles and San Bernardino.

4. *C. inflexus* Muhl. Stems very slender, tufted, 3–15 cm. high; leaves 2 mm. wide or less, nearly equaling the stems, those of the involucre 2–3, exceeding the umbel; umbel sessile, usually capitate; spikelets linear-oblong, 4–6 mm. long, 6–10-flowered; scales pale brown, lanceolate, firm, tapering into a long recurved awn; stamen 1; style 3-cleft; rachis narrowly winged, the wings persistent; achene 3-angled, narrowly obovoid or oblong, obtuse, mucronulate. (*C. aristatus* Boeckl.)

In moist sandy soil. Laguna, San Joaquin Hills, Orange County; Bear Valley, San Bernardino Mountains.

5. *C. esculentus* L. Perennial by scaly horizontal tuber-bearing rootstocks; stems rather stout, 3–6 dm. high; leaves light green, 4–8 mm. wide, usually longer than the stem, with prominent mid-vein, those of the involucre 3–6, the longer much exceeding the umbel; umbel 4–10-rayed, usually compound; spikelets numerous in loose spikes, straw-colored or yellowish brown, spreading, 12–24 mm. long, 3 mm. wide, many-flowered; scales ovate-oblong, sub-acute, 3–5-nerved; rachis narrowly winged; stamens 3; style 3-cleft; achene obovoid, obtuse, 3-angled.

Frequent in river bottoms about Los Angeles, Santa Ana and San Bernardino.

6. *C. parishii* Britton. Annual with fibrous roots; culms tufted, slender, 1–2.5 dm. high; leaves 2–5 mm. wide, shorter than the culm, those of the involucre 2–7, the longer ones exceeding the inflorescence; umbel simple or somewhat compound, usually several-rayed, the rays 5–50 mm. long, slender; spikelets densely short-spicate, linear, acute, 12–20 mm. long, about 2 mm. wide; rachis at length wingless, the narrow wings early deciduous; scales oblong-lanceolate, purple green, obtuse, about 2 mm. long; achenes narrowly ovoid-oblong, nearly black, about half as long as the scale.

Growing in wet sand, on the banks of streams, in the vicinity of San Bernardino.

7. *C. speciosus* Vahl. Annual with stems 1–5 dm. high; leaves shorter than the stems, 4–6 mm. wide, scabrous margined; involucre

leaves longer than the rays; spikelets in usually crowded umbels, narrowly linear, 5 cm. long; scales ovate, acutish, 2 mm. long, greenish or pale with brown margins, readily separating from the axis; wings broad, scarious, wholly adnate to the rachis and enclosing the achenes; stamens 3; achenes pale, oblong-ovoid, 1 mm. long, obtusely 3-angled, mucronulate.

Los Angeles River, *Braunton, Davidson*.

8. *C. longispicatus* Norton. Resembling the last; leaves channeled; umbel compound, loose and spreading or rarely congested; spikelets linear, 1-1.5 cm. long; fertile scales oblong, 3 mm. long, obtuse; achenes oblong, 1-1.25 mm. long, obtusely 3-angled, mucronulate.

San Bernardino and Elsinore Lake, *Parish*.

2. SCIRPUS L. BULRUSH.

Annual or perennial often rush-like sedges with leafy stems or the leaves reduced to basal sheaths. Spikelets terete or somewhat flattened, solitary, capitate, spicate or umbellate, usually subtended by a 1-several-leaved involucre. Scales spirally imbricated, usually all fertile or the lowest sometimes empty. Flowers perfect. Perianth of 1-6 bristles or sometimes wanting. Stamens 2-3. Styles 2-3-cleft, not swollen at the base, wholly deciduous from the achene or its base persistent as a subulate tip. Achene triangular, lenticular or plano-convex.

Spikelets solitary with 1 small bract; roots fibrous.

1. *S. cernuus*.

Spikelets several to numerous; perennial from rootstocks.

Inflorescence apparently lateral; involucre of 1 bract; stems leafless or nearly so.

Stems sharply 3-angled; spikelets in a crowded sessile cluster.

Leaves 2-6, long and narrow.

2. *S. americanus*.

Leaves none-2, short and broad.

3. *S. olneyi*.

Stems terete or very obtusely 3-angled.

Bristles equaling or exceeding the achene, retrorsely barbed.

4. *S. lacustris*.

Bristles shorter than the achenes, ciliate at least below.

5. *S. californicus*.

Inflorescence terminal; stems leafy.

Spikelets large, in dense clusters.

6. *S. pacificus*.

Spikelets small, in loose compound umbels.

7. *S. microcarpus*.

1. *S. cernuus* Vahl. Stems tufted from fibrous roots, slender, 5-20 cm. high, sheathed at base; upper sheath bearing a short slender leaf; involucral bract slender, 2-20 mm. long; spikelet solitary, ovate to oblong-ovate, 3-5 mm. long; scales brownish

with a pale midvein, concave; bristles none; style 3-cleft; achene 3-angled-obovoid, the sides convex, smooth or somewhat granular, dark brown, scarcely 1 mm. long. (*S. riparius* Spreng.)

Occasional on river bottoms about Los Angeles and Santa Barbara. Resembling *Eleocharis* in habit.

2. *S. americanus* Pers. Perennial by long rootstocks; stems sharply 3-angled, with concave sides, erect, 3-12 dm. high; leaves 2-6, narrowly linear, shorter than the stem, keeled; involucre bract solitary, leaf-like, 4-10 cm. long; spikelets appearing as if lateral, sessile in capitate clusters of 1-7, acute, 8-16 mm. long; scales broadly ovate, brown, often emarginate or sharply 2-cleft, the midvein extended into a subulate awn, the margins scarious, ciliate or glabrous; bristles 2-6, retrorsely barbed, shorter than or equaling the achene; style usually 2-cleft; achene obovate, plano-convex, smooth, dark brown, mucronate. (*S. pungens* Vahl.)

Occasional on river bottoms about Los Angeles; Santa Ana; San Diego. April-July.

3. *S. olneyi* Gray. Perennial by long stout rootstocks; stems stout, 6-25 dm. high; sharply 3-angled with concave sides; leaves 1-2, 3-12 cm. long, or sheaths sometimes leafless; involucre bract stout, erect, 1-3 cm. long; spikelets appearing as if lateral, capitate in dense clusters of 5-12, oblong or obovoid-oblong, obtuse, 5-8 mm. long; scales oval or orbicular, dark brown with a green midvein, emarginate or mucronulate, glabrous; bristles usually 6, slightly shorter than or equaling the achene, retrorsely barbed; stamens 3; styles 2-cleft; achene obovate, plano-convex, brown, mucronate.

Common in marshes and along running streams throughout our range. June-September.

4. *S. lacustris* L. Stems stout from creeping rootstocks, terete or rarely obscurely 3-sided, 1-3 m. high, leafless or the basal sheaths bearing a short nearly terete leaf; involucre bract stout, shorter than the inflorescence; spikelets numerous, scattered or more or less clustered in an irregularly compound umbel, oblong-ovoid, 6-10 mm. long; scales broadly ovate, obtuse, usually pubescent; bristles 6, equaling or longer than the achene, slender, retrorsely barbed; style 2-cleft; achene obovate, plano-convex, abruptly mucronate, grayish.

Common along streams and marshes. This and the next are commonly called "Tule." June-September.

5. *S. californicus* (C. A. Myer) Britton. Much resembling the last in habit and size; stems obtusely 3-angled; involucre bract very short, stoutly subulate; umbel compound; spikelets 6-10 mm. long, oblong; scales brown, ovate, awn-pointed by the excurrent midvein; bristles shorter than the achene, rather stout, strongly ciliate at least below; style 2-cleft; achene obovate, plano-convex, nearly white or brown, narrowed above into a short point, contracted at base, 1-1.25 mm. broad. (*S. tatora* Kunth.)

With the last and apparently more common. Typical forms are readily distinguished by the stouter and shorter strongly ciliate bristles, stouter filaments, and smaller achene tapering at the apex. Intermediate forms, apparently hybrids, are occasionally found.

6. *S. pacificus* Britton. Perennial by large rootstocks; stems stout, sharply 3-angled with flat sides, scabrous above, 6-15 dm. high; leaves equaling or exceeding the stem, rough-margined, 5-10 mm. wide, midvein prominent; involucrel leaves 2-4, elongated, erect, similar to those of the stem, often 3 cm. long; spikelets in a dense, often compound terminal cluster of 6-20, ovoid-oblong, obtuse or subacute, 16-24 mm. long, 8-10 mm. broad; scales ovate, brown, puberulent, lacerate or 2-toothed, midvein excurrent into an at length reflexed awn; bristles 1-6, shorter than the achenes, or none; style 2-cleft; achene compressed, flat on the face, convex or with a low ridge on the back, obovate-orbicular, dark brown, shining, 3 mm. long. (*S. maritimus* of the Bot. Cal., not L.)

Common in marshes, especially in somewhat saline places. June-October.

7. *S. microcarpus* Presl. Perennial; stems 6-12 dm. high, rather stout; leaves rough-margined, exceeding the stem; the longer involucrel leaves usually exceeding the inflorescence; umbel 1-2-compound; spikelets 3-25 together in capitate clusters at the ends of usually spreading raylets, ovoid-oblong, 3-4 mm. long, acute; scales brown, with a green midvein, blunt or subacute; bristles 4, barbed nearly or quite to the base, somewhat longer than the achene; stamens 2; styles 2-cleft; achene oblong-obovate, nearly white, plano-convex or with a low ridge on the back, pointed.

Rather common in meadows and along streams in the pine belt of all the mountains. Oak Knoll, near Pasadena, *Mc Clatchie*.

3. ELEOCHARIS R. Br. SPIKE-RUSH.

Annual or perennial herbs, with simple, usually terete stems, and leaves reduced to mere sheaths or the lower rarely bearing a blade. Spikelets solitary, terminal, erect, several-many-flowered, not subtended by an involucre. Scales concave, spirally imbricated. Perianth of 1-12 usually retrorsely barbed bristles, or sometimes wanting. Stamens 2-3. Styles 2-cleft and achene lenticular or biconvex, or 3-cleft and achene more or less distinctly 3-angled. Base of the style persistent on the summit of the achene, forming a terminal tubercle. Styles 2-cleft; achenes lenticular.

Annual with fibrous roots.

Perennial by horizontal rootstocks.

Styles 3-cleft; achenes 3-angled or turgid.

Stems filiform; spikelet compressed.

Stems not filiform; spikelets not compressed.

Tubercle not continuous with the achene.

Tubercle continuous with the achene.

1. *E. capitata*.

2. *E. palustris*.

3. *E. acicularis*.

4. *E. montana*.

5. *E. rostellata*.

1. *E. capitata* R. Br. Annual with fibrous roots; stems slender or filiform, terete, 1-1.5 dm. high; upper sheath 1-toothed; spikelet

ovoid, obtuse, 4–5 mm. high and 3 mm. thick; scales ovate, obtuse, 2 mm. long, brown with a green midvein; stamens 2; bristles 4–6, obscurely toothed, equaling the achene or none; achenes broadly obovoid, black and shining, tubercle flat and disk-like.

San Bernardino, *Parish*.

2. *E. palustris* (L.) R. & S. Perennial by horizontal rootstocks; stems stout, terete or nearly so, striate, 3–8 dm. high; basal sheaths brown, rarely bearing a short blade, the upper one obliquely truncate; spikelet ovoid-cylindric, 6–24 mm. long, 3–4 mm. broad, thicker than the stem; scales ovate-oblong or ovate-lanceolate, purplish-brown, with scarious margins and a green midvein; bristles usually 4, slender, retrorsely barbed, longer than the achene, sometimes wanting; stamens 2–3; style 2–3-cleft; achene brownish or yellowish-brown, smooth, obovate; tubercle conic-triangular, constricted at the base, flattened, $\frac{1}{4}$ – $\frac{1}{2}$ as long as the achene.

Common in wet places along streams throughout our range. May–August.

3. *E. acicularis* (L.) R. & S. Perennial by filiform rootstocks or stolons; stems filiform, tufted, obscurely 4-angled and grooved, erect or spreading, 4–10 cm. long; sheaths truncate; spikelet compressed, narrowly ovate, acute, 3–10-flowered, 3–6 mm. long, 1 mm. broad; scales oblong, obtuse, thin, pale green, with a narrow band of brown on each side of the midvein, deciduous, many usually sterile; bristles 3–4, fugacious, shorter than the achene; stamens 3; style 3-cleft; achene obovoid-oblong, obscurely 3-angled, with a rib on each angle and 6–9 intermediate ones, connected by fine ridges; tubercle conic, acute, $\frac{1}{4}$ as long as the achene.

Frequent in moist places along streams and on borders of ponds. April–June.

4. *E. montana* (H. B. K.) R. & S. Perennial; stems slender, sulcate, 15–45 cm. high, erect; basal sheaths brown; spike oblong or sometimes ovate, 4–10 mm. long, rounded at the apex; scales numerous, closely imbricated, ovate, very obtuse, brown with green midvein, scarious margined; bristles 4–6, about equaling the achene; style 3-cleft; achene obtusely 3-angled, oblong-obovate, about 1 mm. long, greenish brown, smooth; tubercle broad at the base and slightly constricted, deltoid, acute. (*E. arenicola* Torr.)

Frequent on river bottoms and borders of marshes throughout our range.

5. *E. rostellata* Torr. Perennial; stems rather slender, compressed, strongly sulcate, 3–8 dm. high; often reclining and rooting at the apex; basal sheaths light colored, truncate; spike oblong, 6–10 mm. long; scales straw-colored or pale brown, ovate, obtuse, carinate and rather firm, about 4 mm. long; bristles 6, exceeding the achene; style 3-cleft; achene obovate, obtusely 3-angled, about 2 mm. long; tubercle not constricted at the base, pyramidal, about 1 mm. long. (*E. rostellata occidentalis* Wats.)

Frequent in marshes and on river bottoms about Los Angeles and San Bernardino.

4. **FIMBRISTYLIS** Vahl.

Annual or perennial herbs with stems leafy below. Spikelets umbellate, several-many-flowered, subtended by a 1-many-leaved involucre, their scales spirally imbricated, mostly deciduous, all fertile. Perianth none. Stamens 1-3. Style 2-3-cleft, pubescent or glabrous, its base much enlarged, falling away from the achene when mature. Achene lenticular, biconvex or 3-angled.

1. **F. thermalis** Wats. Perennial by short matted rootstocks; stems 3-6 dm. high, flattened and somewhat roughened, striate; leaves 2-4 mm. wide, flat, becoming more or less revolute, somewhat pubescent or nearly glabrous, rough on the margins; involucre bracts linear-subulate, acuminate, scabrous, 15-25 mm. long, shorter than the rays; spikelets umbellate, solitary on the ends of the rays, ovate to linear-oblong, 8-18 mm. long; scales ovate, obtuse, mucronate, dull brown, pubescent; style 2-cleft, flattened and ciliate; achene obovate, lenticular, obscurely striate, 1.5 mm. long; tubercle soon deciduous.

Hot Springs, near San Bernardino, *Wright*; Waterman's Hot Springs, *Parish*.

5. **SCHOENUS** L.

Ours perennial herbs from rootstocks, with slender erect tufted stems and slender subterete basal leaves. Involucre bract erect, appearing as a continuation of the stem. Spikelets sessile in capitate lateral clusters, few-flowered. Scales imbricated in 2 rows, the lower ones empty, the upper bearing perfect flowers. Perianth of 6 scabrous or pubescent bristles. Stamens 3. Style 3-cleft, not dilated at the base. Achene more or less 3-angled, with a very short beak.

1. **S. nigricans** L. Stems tufted, slightly compressed, slender, 5-7 dm. high; leaves rigid, subterete, channeled, rough on the margins, shorter than the stems; sheaths black; involucre bract 3-5 cm. long; spikelets capitate clustered, ovate lanceolate, compressed, 6-8-flowered; rachis zigzag; scales ovate, acute, compressed, keeled, very dark brown; bristles 6, unequal, dilated at the base, barbed above, longer than the achene; achenes globose-oblong, 3-angled, white and shining.

Arrowhead Hot Springs, near San Bernardino, *Parish*. Otherwise known in North America only from Florida.

6. **CLADIUM** R. Br.

Perennial herbs with stout rootstocks, stout tall leafy stems and elongated channeled leaves. Spikelets small,

usually clustered in terminal corymbs, panicles or cymes. Scales mostly about 5, closely imbricated, brown, the lower empty, the terminal one fertile and the 1-2 below it staminate. Perianth none. Stamens 2-3. Style 2-3-cleft, somewhat dilated at the base, continuous with the ovary. Achene ovate or oblong-ovate, smooth, acute with the obscure persistent base of the style.

1. *C. mariscus californicum* Wats. Stems in rather dense tussocks, stout, 18-24 dm. high; leaves equaling the stem; panicle diffuse, drooping; spikelets in clusters of 2-3, narrowly oblong, 4-6 mm. long; lower scales ovate, acutish or acute, the upper lanceolate, acute or acuminate, light brown; achene brown, ovate, attenuate above.

Collected in a swamp near San Gabriel (*Brewer*), but not seen since in southern California until recently when it was discovered near Upland (*Johnston*).

7. CAREX L. SEDGE.

Grass-like sedges, perennial by rootstocks, with mostly 3-angled stems. Leaves 3-ranked, the upper elongated or short and subtending the spikes of flowers or wanting. Flowers monoecious or dioecious, solitary in the axils of scales. Spikes either wholly pistillate or staminate, or bearing staminate and pistillate flowers (androgynous). Perianth none. Staminate flowers of 3 stamens. Pistillate of a single pistil with a style and 2-3 stigmas borne on a very short axis in the axil of a scale-like bractlet (perigynium) which completely encloses the achene. Achene 3-angled, lenticular or plano-convex.

Spikelets unisexual, all distinct and sometimes remote, staminate uppermost.

Perigynia attenuate to a beak, one-third as long as the body or longer.

Spikelets drooping.

Spikelets erect.

Perigynia short-beaked or beakless.

Pistillate spikelets compactly many-flowered.

Stigmas 3.

Stigmas 2.

Beaks of perigynia 2-toothed.

Beaks of perigynia entire.

Pistillate spikelets 3-5 cm. long, peduncled.

Pistillate spikelets 6-10 cm. long, sessile.

1. *C. comosa*.

2. *C. lanuginosa*.

3. *C. spissa*.

4. *C. laciniata*.

5. *C. senta*.

6. *C. barbarae*.

Pistillate spikelets loosely few-flowered,
green.

Stigmas 2.

7. *C. hassei*.

Stigmas 3.

8. *C. triquetra*.

Spikelets androgynous, the staminate flowers at
the summit or base or intermingled.

Spikelet solitary, the pistillate flowers 2-6,
loosely disposed.

9. *C. multicaulis*.

Spikelets several, sessile, and more or less
aggregated in heads.

Staminate flowers at the summit of the
spikelets.

Heads elongated, interrupted, panicu-
lately decomposed.

10. *C. alma*.

Heads ovoid or narrow, spikelets
simple.

Rhizomes black.

11. *C. marcida*.

Rhizomes scaly and brown.

Heads ovoid, congested.

12. *C. bernardina*.

Heads narrow, spikelets separ-
ated.

13. *C. hookeriana*.

Staminate flowers usually at the base of
the spikelets.

14. *C. siccata*.

1. *C. comosa* Boott. Stems stout, 4-6 dm. high, angles sharp and scabrous; leaves rigid, nodose, 5-10 mm. wide, long, tapering; spikelets 4-6, densely flowered, the uppermost staminate, linear, 25-80 mm. long; pistillate spikelets 4-7 cm. long, 8-15 mm. wide, cylindric, approximate or the lowest remote; scales pale, attenuate to a long hispid point, lanceolate or oblong, those of the staminate linear-lanceolate; perigynium coriaceous, pale olive, ovate to lanceolate, attenuate to a long beak; beak bidentate, the teeth about 2 mm. long; nutlet obovoid, chestnut colored. (*C. Pseudo-Cyperus comosa* Boott.)

Canyon near Burbank, *Davidson*; San Bernardino, *Parish*.

2. *C. lanuginosa* Michx. Stems 3-8 dm. high, stoloniferous; leaves often exceeding the stems, 2-4 mm. wide, spikelets 3-4, purple, staminate 1-4, linear, 3-5 cm. long, more or less pedicelled, the lower sessile; pistillate 2-4, oblong or cylindric, 2-5 cm. long, 6-8 mm. wide, densely flowered, remote, sessile or the lowest pedicelled; pedicels scabrous; scales purple, pale in the middle, acute, ciliate at the apex; perigynium coriaceous, hispid, ovoid, obtusely angled, olive-colored; beak short, with short divergent scabrous teeth, broader and usually shorter than the scales.

Occasional in fresh-water marshes in the coast valleys, *Davidson*.

3. *C. spissa* Bailey. Stems stout, 1-2 m. high, smooth or nearly so; leaves numerous, rigid, glaucous, serrate, about equaling the stem, 10-15 mm. wide; lower bract long, leaf-like, the uppermost short or nearly obsolete; spikelets 6-12 or more, the lowest 10-15 cm. long, long-pedicelled, the upper becoming sessile, all erect, cylindric; staminate 4-6 or more, 3-10 cm. long; scales with a stout

toothed awn; perigynium about 3 mm. high, elliptic or obovate, coriaceous, few-flowered, yellowish-green.

Occasional in the canyons of all the mountains and foothills.

4. *C. laciniata* Boott. Stems stout, sharply angled, 6–11 dm. high; leaves rather numerous, nearly equaling the stems, 4–8 mm. wide; bracts very long; spikelets 4–6, cylindric; staminate 1–2, commonly pedicelled, 2.5–7 cm. long, 4–6 mm. wide; pistillate 5–8 cm. long, 4–9 mm. wide, remote, the upper sessile, the lower long-pedicelled, nodding; scales purple or ferruginous, pale in the middle, ciliate, acute or with rough awn; perigynium abruptly or gradually beaked, nearly entire to bidentate with serrate teeth, compressed-lenticular, punctate, sparingly toothed on the upper margins.

First collected at Santa Barbara by Nuttall. Occasional in marshes in coast valleys.

5. *C. senta* Boott. Stems slender, 3 dm. high, scabrous on the sharp angles; leaves shorter than the stems, 2–4 mm. wide; staminate spikelets 1–2; pistillate 2–3, on short peduncles, 3–5 cm. long, 4–5 mm. thick; scales narrowly lanceolate; perigynia ovoid or obovoid; achenes light brown, orbicular, smooth, mucronulate.

Near San Fernando, *Brewer*; Cienega, *Davidson*.

6. *C. barbarae* Dewey. Stems 5–10 dm. high, leafy, glaucous, sharply angled and rough at least above; bracts leaf-like, the lower long; pistillate spikes 2–4, 25–75 mm. long, narrow, the lower with slender pedicels, 7.5–10 cm. long, attenuate at the base, usually truncate at the apex, scales white backed and brown edged, obtuse; perigynium nerveless, abruptly contracted into a short distinct beak.

Occasional in marshes about Los Angeles and Santa Barbara.

7. *C. hassei* Bailey. Stoloniferous by slender rootstocks; stems slender or filiform, 25–50 cm. high; leaves thin, scabrous on the margins, 2–4 mm. wide, long-pointed, much shorter than the stems; bracts similar, the lowest slightly surpassing the inflorescence; staminate spikelet oblong, acute, 1 cm. long, peduncled; pistillate 1–5, cylindric, the terminal often having 2–3 very short sessile spikelets at base, the lowest remote and usually long peduncled; scales shorter than the perigynia, green with brown margins, ovate, cuspidate; perigynia green, obovoid, strongly nerved, 2–5 mm. long; achenes conspicuously beaked, filling the perigynia.

First collected on the West Fork of the San Gabriel, *Hasse*; wet meadows, San Bernardino Valley, *Parish*.

8. *C. triquetra* Boott. Stem 3–5 dm. high, slightly scabrous, leaves pale, 2–5 mm. broad, equaling or shorter than the stem; spikelets 3–5, oblong; staminate about 18 mm. long, 2 mm. broad, subsessile; pistillate 12–18 mm. long, 3–4 mm. broad, erect, the upper approximate, the lower pedicelled, all with abortive flowers above; scales pale chestnut, ovate, numerous, margins hyaline; perigynium pale, covered with long white hairs, ellipsoidal, sharply 3-angled, acute at each end, with a short bidentate beak, 1–4-nerved, longer and broader than the scale; nutlet filling the perigynium.

Frequent on dry ground in the Santa Monica, San Gabriel and San Bernardino Mountains.

9. *C. multicaulis* Bailey. Culms very numerous, 3-6 dm. high, stiff and wiry, terete, smooth or minutely scabrous beneath the flowers; sheaths leafless or produced into stiff and appressed tips, 2 cm. long or more, or on sterile stems 8-15 cm. long and spreading; the lower scales leaf-like and prolonged into a slender tip, dilated and hyaline at the base; pistillate flowers 2-6, the lower often remote; perigynium 6-8 mm. long, strongly 3-angled, many-nerved; beak very short, entire; nutlet punctate, completely filling the perigynium.

Frequent on dry ridges in the pine belt of all the mountains.

10. *C. alma* Bailey. Stems stoutish, rough above on the sharp angles, 4-12 dm. high; leaves carinate, 3-5 mm. wide, mostly exceeding the stems; heads 9-12 cm. long, 10-15 mm. thick; spikelets ovoid, in ovoid clusters; scales equaling the perigynia, oval to oval-oblong, acute or the midvein excurrent; perigynia brown, shining, nerveless, ovoid, narrowed to a long 2-toothed beak, serrate on the sharp margins, thick and spongy at the truncate base, 3.5-4 mm. long; achenes brown, lenticular, faintly punctate.

Growing in robust clumps along streams in the mountains. Near Pasadena, *Mc Clatchie*; near Santa Ana, *Helen Geis*.

11. *C. marcida* Boott. Stem 3-6 dm. high, scabrous above; leaves 2 mm. wide, shorter than the stem; spike 2-4 cm. long, 6-10 mm. wide, dull brown; spikelets many, crowded or contiguous, closely imbricated, 4-6 mm. long, 2 mm. broad, the lower compound; bracts clasping, scale-like, setaceously pointed, the lowest exceeding its spikelet; scales ovate, acute or cuspidate, margin hyaline, brownish; perigynium nearly black in fruit, orbicular with a short, or ovate and with a longer bidentate beak, stipitate, plano-convex, margins incurved, serrate above, nerved, equaling the scales; nutlet ferruginous, lenticular, produced at the base.

Frequent in marshes in the coast valleys.

12. *C. bernardina* Parish. Rhizomes creeping; stems slender and lax, rough on the sharp edges, 5-6 dm. high; leaves 1-3 mm. wide, shorter than the stems; spikelets in a dense ovoid head, about 2 cm. long and 1-1.5 cm. thick; scales a little shorter than the perigynia, hyaline, with a brown midvein, ovate, acute; perigynia brown, suborbicular, strongly nerved on the exterior face, the subcordate base stipitate, 2-2.5 mm. long, contracted to a serrate beak as long as the body; achenes pallid, lenticular, faintly punctate, conformed to the body of the perigynium.

In a meadow, San Bernardino Valley, *Parish*.

13. *C. hookeriana* Dewey. Stems slender from creeping rootstocks, 2-6 dm. high, sharply angled, scabrous; leaves shorter than the stem, 2 mm. wide, tapering to a slender setaceous tip; bracts ovate, awned, commonly exceeding the spikelet, the lowest setaceous and often 25-50 mm. long; spike 2-4 cm. long, oblong or cylindric; spikelets 4-10, approximate; staminate flowers few; scales ovate or lanceolate, acute, chestnut-colored with green midnerve, margin hyaline; perigynium oval, abruptly tapering to a sharply bidentate beak, serrate above on the sharp incurved margins, shorter than the scale.

Frequent on borders of the coast marshes.

14. *C. siccata* Dewey. Rootstock creeping, clothed with short lanceolate scales; stems slender, sharply angled, 15–60 cm. high, scabrous above; leaves rather rigid, 1–4 mm. wide, shorter than the stems, scabrous on the margins above; bracts scale-like, the lowest cuspidate, usually shorter than its spikelet; spikes oblong, 2–5 cm. long, 4–8 mm. broad, ferruginous; spikelets 4–12, alternate, simple, ovoid, 4–16 mm. long, 2–8 mm. broad, crowded or distinct below, the terminal pistillate at least at base, the intermediate staminate or all variously mingled; scales ovate-lanceolate, acute, ferruginous, with broad hyaline margins; perigynium oval or ovate, tapering to a long, sharply bidentate beak, fissured on the outer side, unequally serrate on the margins, plano-convex, nerved, about equaling the scale; nutlet oblong, dark chestnut.

Common on borders of marshes throughout our ranges. Cienega; Playe del Rey; Santa Ana; San Bernardino.

Family 11. LEMNACEAE. DUCKWEED FAMILY.

Minute perennial floating plants, without leaves or with only very rudimentary ones. The plant body consisting of a disk-like thallus, with usually 1 or more rootlets from the middle below. Florets imbedded in the frond, without perianth, naked or bracteate, with 1–2 stamens and a sessile 1-celled, 1–several-ovuled ovary. Style simple with funnelform stigma. Fruit a utricle; embryo straight.

Roots 1 or more.

Roots more than 1, fascicled.

Root solitary.

Roots none.

1. SPIRODELA.

2. LEMNA.

3. WOLFFIELLA.

1. SPIRODELA Schleiden.

Stipe attached (peltately) to the frond back of and under the basal margin. Reproductive pouches 2, triangular, opening as clefts in either margin of the basal portion of the frond. Roots more than 1, fascicled. Spadix of 1 pistillate and 2 staminate flowers from the reproductive pouches; spathe sac-like; filaments curving upward from the margin of the frond; anthers 2-celled, longitudinally dehiscent. Fruit rounded lenticular, with wing margins.

1. *S. polyrhiza* (L.) Schl. Fronds solitary or united in colonies of 2–5, roundish obovate, flat on both sides, sessile or nearly so; 5–15-nerved, 3–6 mm. long, 2.5–4.5 mm. wide; roots 4–16; rootcap

large, sharp pointed; spathe a complete sac, opening at the upper end; pistil flask-shaped; fruit somewhat winged; seed slightly compressed, smooth.

Near San Bernardino, *Parish*. This, as well as all the other members of the family occurring with us, is rarely fertile.

2. LEMNA L. DUCKWEED.

Stipe attached to the basal margin of the frond. Reproductive pouches 2, triangular, opening as clefts in either margin of the basal portion of the frond. Root solitary. Spadix of 1 pistillate and 2 staminate flowers; spathe various; filaments curving upward from the margin of the frond. Anthers 2-celled, transversely dehiscent.

Fronds with a short stipe; floating on the surface.

Spathe sac-like.

Frond pale beneath, usually strongly gibbose.

Frond green or purplish beneath.

1. *L. gibba*.

2. *L. minor*.

Spathe open.

Frond thin, without papules.

3. *L. cyclostasa*.

Frond thick, with a row of papules along the nerve.

4. *L. minima*.

Fronds long-stipitate, mostly submerged.

5. *L. trisulca*.

1. *L. gibba* L. Fronds from solitary to 4 in a colony, commonly 2, orbicular to obovate, 2–5 mm. long, 2–4 mm. wide, more or less unsymmetrical, thick, convex and slightly keeled above, usually more or less gibbous beneath, usually 3–5-nerved; fruit winged with rounded lobes on either side of the stigma; seeds 1–7.

Common in slow-running streams and ponds.

2. *L. minor* L. Fronds solitary or with 2 or more in a colony, round to elliptic-obovate, 2–4 mm. long, 1.5–3 mm. wide, symmetrical, thickish, convex on both sides, upper surface sometimes keeled and with a row of papulae along the midnerve, obscurely 3-nerved; fruit not winged; seeds solitary.

Apparently less common than the last.

3. *L. cyclostasa* (Ell.) Chev. Fronds commonly in colonies of 2–8, oblong to obovate-oblong, usually somewhat falcate, 2.3–4.5 mm. long, 0.7–1.5 mm. wide, usually strongly unsymmetrical; fruit elongated-ovate, slightly unsymmetrical; seed oblong-ovoid. (*L. valdiviana* Phil.)

Common throughout our range.

4. *L. minima* Phil. Fronds commonly in colonies of 2, oblong to elliptic, 1.5–3.9 mm. long, 0.9–2.7 mm. wide, slightly to prominently convex above, with a row of papulae along the midnerve, convex below, commonly nerveless; pistil short, clavate; seed oblong, pointed.

Near San Bernardino, *Parish*; Bear Valley, San Bernardino Mountains; Lakeside, San Diego County.

5. *L. trisulca* L. Fronds floating and submerged, oblong to oblong-lanceolate, with a long stipe attached to the basal margin; often somewhat falcate, 5–10 mm. long, 2–3 mm. wide; terminal margins serrulate and fluted, acute at apex.

Bear Valley, San Bernardino Mountains.

3. *WOLFFIELLA* Hegelmaier.

Stipe attached on the margin of the single reproductive pouch. Pouch triangular, opening as a cleft in the basal margin of the frond. Fronds rootless, thin, unsymmetrical, curved in the form of the segment of a band, abundantly punctate on both surfaces with brown epidermal pigment cells. Flowers and fruit unknown.

1. *W. oblonga* (Phil.) Hgln. Fronds solitary or in pairs, oblong or commonly tapering from the obliquely rounded base to the slightly narrower bluntly rounded apex; slightly falcate; basal portion alone exposed to the air, 0.53–1 mm. broad, 1.7–4.6 mm. long; stipe insertion at the lower angle of the two walls of the pouch.

Near San Bernardino, *Parish*.

2. *W. lingulata* Hgln. Fronds solitary or rarely in pairs, ovate to oblong, tongue-shaped, slightly unsymmetrical; 1.7–3 mm. broad, 2.7–6.6 mm. long, only a small part of the frond about the base exposed to the air; stipe insertion on the margin of the lower wall of the pouch.

San Bernardino, *Parish*.

Family 12. JUNCACEAE. RUSH FAMILY.

Perennial or sometimes annual rushes or sedge-like herbs, growing in tufts or from creeping rootstocks. Inflorescence usually compound, paniculate or corymbose, rarely reduced to a single flower, bearing its flowers singly or loosely clustered or aggregated into heads or spikes. Flowers small, regular, perfect. Perianth 6-parted, the segments glumaceous. Stamens 3 or 6; anthers introrse, 2-celled, dehiscing by a longitudinal slit. Ovary superior, 3-celled or sometimes 1-celled with 3 parietal placentæ. Ovules 3–many, anatropous; styles 3, filiform. Fruit a loculicidal capsule. Seeds small, cylindric to subglobose, often caudate or appendaged; endosperm fleshy; embryo minute, thick.

Represented with us by a single genus.

1. *JUNCUS*.

1. JUNCUS L. RUSH.

Perennial or sometimes annual, glabrous plants, growing usually in marshes or wet places, with simple terete or flattened, usually pithy stems. Leaves terete, channelled or flat. Flowers solitary or clustered in cymes, panicles or heads, greenish or brownish. Stamens 6 or 3. Capsule 3-celled, or 1-celled with 3 parietal placentæ, many-seeded.

Annual, with low branching stems. 1. *J. bufonius*.
Perennials.

Flowers solitary on the pedicels, each surrounded by 2 bractlets; pedicels 1 bracteate at base; stems leafless or with terete basal leaves.

Stamens 3.

2. *J. effusus*.

Stamens 6.

Stems sulcate with subepidermal fascicles.

Flowers 4–5 mm. long; perianth-segments closed over the capsule.

3. *J. textilis*.

Flowers 3 mm. long; perianth-segments divergent.

4. *J. patens*.

Stems smooth.

Stems terete.

5. *J. balticus*.

Stems compressed.

6. *J. mexicanus*.

Flowers bracteate only at the base of the pedicel.

Flowers lateral, the lowest bract apparently continuous with the stem, pungent.

7. *J. acutus sphaerocarpus*.

Flowers terminal.

Leaves septate.

Leaves ensiform, the edges turned toward the stem.

Stems wingless; styles long-exserted.

8. *J. phaeocephalus paniculatus*.

Stems narrowly winged; styles short.

9. *J. xiphioides*.

Leaves terete.

Heads 30-40-
flowered; stems
not rugosely
roughened. 10. *J. torreyi*.

Heads 6-10-
flowered; stems
rugosely
roughened. 11. *J. rugulosus*.

Leaves grass-like, not
septate. 12. *J. macrophyllus*.

1. *J. bufonius* L. Stems usually branching from the base, 5-25 cm. high, with fibrous roots; leaves 0.5 mm. wide or less; flowers mostly solitary and remote upon the spreading branches; perianth segments lanceolate, greenish, with scarious margins, 4-6 mm. long; stamens 6, sometimes 3, 2-3 mm. long; anthers shorter than the filaments; capsule oblong, obtuse, shorter than the perianth.

Common in the valleys and mountains in moist ground.

2. *J. effusus* L. Perennial from creeping rootstocks, forming dense clumps, 5-8 dm. high; stems stout, terete, leafless; panicle lateral, compact, many-flowered; perianth, brown, 2 mm. long; stamens 3; capsule clavate-oblong obtuse or retuse.

Not collected within our limits, but found in San Bernardino Valley *Parish*, also in the San Bernardino Mountains (*Abrams*) and San Ysabel (*Abrams*).

3. *J. textilis* Buchn. Stems rigid, stout, 1.5-2.5 m. high, leafless, from a stout creeping rhizome; panicle lax and widely spreading, 6-12 cm. long; perianth segments 5-6 mm. long, lanceolate, acuminate, with brown margins; anthers much longer than the filaments; capsule oblong-ovate, acute, beakless, about equaling the perianth.

Occasional along streams in foothill canyons. What seems to be the same has been collected by the author along New River near Long Beach.

4. *J. patens* Meyer. Stems rather soft, 0.5-1 m. high; inner sheaths tipped with a short awn; panicle rather open, about 4 cm. long; perianth segments 3 mm. long, often brownish, spreading in fruit; stamens 6; capsule subglobose, slightly angled, obtuse, apiculate, equaling or a little shorter than the perianth.

Canyons of the Santa Monica Mountains, *Hasse*.

5. *J. balticus* Willd. Stems rigid, rather slender, leafless, 3-4 dm. high; panicle 2-4 cm. long; perianth segments lanceolate, acute, 4-5 mm. long, brownish; capsule rather acutely angled, beaked; seeds distinctly reticulate.

Frequent along streams and in low ground generally throughout our range.

6. *J. mexicanus* Willd. Closely resembling the last, but more slender, 12-24 cm. high; stems somewhat flattened, sheaths frequently leaf-bearing; panicles about 2 cm. long, loosely few-flowered; perianth segments 4-5 mm. long, lanceolate, greenish or slightly tinged with brown. (*J. compressus* H. B. K.)

Habitat similar to the last, and apparently more common.

7. *J. acutus sphaerocarpus* Engelm. Stems and leaves 0.5–1.5 m. high, stout, rigid and pungent, growing in large tussocks; panicle 6–12 cm. long, about equaling the spathe, secondary spathes long-acuminate; clusters 2–4-flowered; perianth segments scariously margined, outer broadly lanceolate, acute, inner obovate, deeply emarginate, 2 mm. long; capsule subglobose, apiculate, about 4 mm. long. (*J. robustus* Wats.)

Salt marshes near the coast. Playa del Rey; Wilmington.

8. *J. phaeocephalus paniculatus* Engelm. Stems from a creeping rootstock, ancipital, 3–7 dm. high; leafy; leaves flat, 2–6 mm. wide, often exceeding the stems; flowers in several few-flowered heads arranged in a compound panicle; perianth segments brownish, 3–4 mm. long, lanceolate acuminate; stamens 6; anthers usually exceeding the filaments; style long exserted; capsule acute; seeds ovate, closely reticulated.

Frequent along streams and in low brackish places. May–July.

9. *J. xiphioides* Meyer. Perennial from stout elongated rootstocks; stems 5–10 dm. high, leafy, more or less winged; leaves ensiform, the edges turned toward the stem, 4–8 mm. wide, transversely septate; flowers in dense heads, arranged in cymose panicles; perianth usually dark, 5 mm. long; style very short.

Marsh lands near Los Angeles, *Davidson*; peat lands, Orange County, *Helen Geis*; San Bernardino, *Parish*.

10. *J. torreyi* Coville. Stems 2–10 dm. high; rootstocks slender, with tuberiform thickenings a few centimeters apart, each supporting a single stem; stem stout, 1–4-leaved; blade stout, terete, 10–25 mm. thick, spreading; heads 1–20, exceeded by the lowest bract, each 10–16 mm. in diameter; perianth 5–7 mm. long, the segments subulate; stamens 6; capsule subulate, 3-sided, exceeding the perianth. (*J. nodosus megacephalus* Torr.)

Occasional along streams. Los Angeles River, *Davidson*; peat lands, Orange County, *Helen Geis*.

11. *J. rugulosus* Engelm. Stems 4–10 dm. high from a stout running rootstock, rather weak, pale green and transversely rugose and roughened; leaves 3 mm. wide, transversely rugose and septate; panicle decompound, lax, 5–15 cm. long and as wide; perianth segments linear-lanceolate, very acute, 2 mm. long; capsule lanceolate acute, 3-angled, exceeding the perianth.

Frequent along mountain streams from the San Gabriel Mountains southward to the Cuyamaca Mountains.

12. *J. macrophyllus* Coville. Stems several, simple, leafy, 3–5 dm. high; leaves much shorter than the stems, flat and grass-like, the sheaths with distinct ligules; heads usually 5–9 in a sparingly branched panicle, exceeding the very short spathe, few-flowered; perianth segments greenish, narrowly ovate acuminate; stamens 6; seeds oblanceolate, minute, faintly ribbed.

Frequent on dry ridges in the pine belt of the San Gabriel and San Bernardino Mountains.

Family 13. LILIACEAE. LILY FAMILY.

Scapose or leafy-stemmed herbs from bulbs or corymbs or rarely with rootstocks or a woody caudex. Leaves various. Flowers solitary or clustered, regular, mostly perfect. Perianth segments 6, distinct. Stamens 6, hypogynous or borne on the perianth or at the base of its segments; anthers 2-celled, mostly introrse. Ovary superior, 3-celled. Ovules few or numerous, in each cavity; styles united; stigma 3-lobed. Fruit a loculicidal capsule; endosperm copious.

Herbs with bulbs or corms.

Flowers not umbellate.

Stems from a tunicated bulb.

Styles 3, distinct.

1. ZYGADENUS.

Styles united, more or less 3-cleft.

2. CHLOROGALUM.

Stems from a scaly bulb.

Perianth very showy, its segments reflexed.

9. LILIUM.

Perianth segments not reflexed.

10. FRITILLARIA.

Stems from a corm; flowers showy.

11. CALOCHORTUS.

Flowers umbellate.

Perianth segments distinct or nearly so.

Odor and taste alliaceous; ovules 1 or 2 in each cell.

3. ALLIUM.

Odor and taste not alliaceous; ovules several in each cell.

Flowers greenish-white.

4. MUILLA.

Flowers yellow.

5. BLOOMERIA.

Perianth segments united below into a tube.

Stamens 6.

Perianth-tube more or less inflated; inner stamens appendaged.

6. DICHELOSTEMMA.

Perianth-tube funnellform; stamens unappendaged.

8. TRITELIA.

Stamens 3; staminodia 3.

7. HOOKERA.

Herbaceous or with woody caudex, not arising from bulbs or corms.

Plants with short stout woody caudex and large panicle of showy flowers.

12. HESPEROYUCCA.

Leaves scale-like; branchlets numerous, filiform.

13. ASPARAGUS.

1. **ZYGADENUS** Michx. ZYGADENE.

Stems simple, scale-like, from a tunicated bulb, glabrous and somewhat glaucous, with linear mostly basal leaves and greenish-white flowers, in a raceme or panicle. Perianth nearly rotate, segments ovate to oblong-lanceolate, with a green glandular spot at the narrowed base. Stamens free from the segments and about equaling them; filaments subulate. Styles distinct, persistent. Capsule deeply 3-lobed. Seeds brownish, angled.

1. **Z. fremontii** Torr. Bulb oblong, 2-5 cm. long, with dark coats; stems 4-8 dm. high; basal leaves 2-4 dm. long, 1.5-2.5 cm. broad at the base, somewhat falcate-curving; stem leaves few, shorter, sheathing at the base; flowers few to many in a raceme or panicle; lower pedicels 2.5-4 cm. long; segments 8-14 mm. long, the outer not clawed, the inner with a broad claw; gland greenish yellow, toothed on its upper margin; stamens about as long as the segments; capsule oblong, about 2 cm. long.

Occasional on the northern slope of the Santa Monica Mountains and Verdugo Hills. April.

2. **CHLOROGALUM** Kunth. SOAP-PLANT.

Stems from a fibrous-coated bulb, tall, almost leafless, paniculately branched above, the branches loosely racemose. Basal leaves tufted, long-linear, the stem leaves much reduced. Bracts small and scarious. Pedicels jointed at the summit. Perianth white or purplish, persistent and at length twisted over the ovary, its segments distinct, ligulate, spreading, with 3 closely approximate nerves down the middle. Stamens 6, inserted on the base of the segment; anthers versatile. Style long-filiform, slightly 3-cleft. Capsule broadly turbinate, 3-valved, loculicidal. Seeds 1 or 2 in each cell, obovate, somewhat rugose.

1. **C. pomeridianum** (Ker.) Kunth. Bulbs large, about 1 dm. long, densely and coarsely fibrous-coated; stem and spreading panicle 6-15 dm. high; leaves 2-5 dm. long, 12-30 mm. broad, carinate and undulate; pedicels slender, about 6 mm. long; perianth rotate, its segments 16-20 mm. long, white with purple veins; capsule about 6 mm. long.

Common on dry hillsides and plains. May-July.

3. **ALLIUM** L. ONION.

Scapes from a tunicated bulb or rarely from a coated corm, with mostly narrowly linear basal leaves. Herb-

age with the characteristic odor and taste of onions. Flowers in a terminal simple umbel, subtended by 2 or 3 membranous, separate or united bracts. Pedicels slender, not jointed. Perianth persistent, its segments distinct or united at the base. Stamens inserted on the bases of the perianth segments; filaments filiform or dilated, sometimes toothed. Style filiform, jointed. Capsule obovate-globose, obtusely 3-lobed, often crested, loculicidally dehiscent. Seeds obovoid, wrinkled, black.

1. **A. haematochiton** Wats. Scape slender, 1-3 dm. high, somewhat compressed and 2-edged; tunicated bulb oblong, crowning a horizontal rhizome, its coats deep reddish-purple, shining; leaves several, linear, flat and rather thick, 2-4 mm. broad, about equaling the scape; bracts 2, short connate; umbel erect or somewhat nodding, deep purple or rose-color; segments ovate-lanceolate, acute, 6-8 mm. long; stamens and style very slender, scarcely equaling the segments; ovary truncate with very short rounded crests; capsule obcordate, 4 mm. long.

On dry rocky hillsides. Santa Monica Mountains and Verdugo Hills. April-May.

2. **A. serratum** Wats. Scape terete, slender, about 1 dm. high; bulb nearly globose, without rhizome, its coats with a distinct close horizontally serrate denticulation; leaves 2 or more, somewhat shorter than the scapes; bracts narrowly acuminate; perianth segments broadly ovate-lanceolate, 8-12 mm. long, acute or somewhat acuminate, nearly straight and rather rigid, the inner shorter and sometimes serrulate; filaments all with a narrowly deltoid base; crests very narrow central.

Glendale, *Davidson*.

4. **MUILLA** Wats.

Scape from a fibrous corm and bearing an umbel subtended by several small scarious bracts. Leaves mostly few, very narrow, nearly terete. Pedicels not jointed. Perianth subrotate, persistent, of 6 nearly equal slightly united oblong-lanceolate segments, greenish or yellowish white with a dark 2-nerved midrib. Stamens inserted near the base; filaments filiform, slightly thickened toward the base or petaloid; anthers versatile. Ovules 8-10 in each cell; style clavate, persistent and at length splitting. Capsule globose, scarcely lobed, loculicidal. Seeds compressed and angled.

1. **M. serotina** Greene. Scapes 3-5 dm. high, glabrous; leaves 3-4 dm. long, subterete, the upper surfaces nearly plane, the lower convex and sharply 7-striate, the striae retrorsely scabrous; umbel 40-70-flowered; pedicels nearly 10 cm. long; perianth rotate about

12 mm. broad, greenish-white; outer segments oblong-linear, the inner oblong; filaments stout, subulate, little compressed; anthers 1 mm. long, lurid purple.

Frequent in dry stony places in the plains and foothills. April-May.

5. **BLOOMERIA** Kell. GOLDEN STARS.

Scape from a fibrous coated corm, with linear carinate basal leaves and many yellow flowers in a terminal umbel, subtended by membranous bracts. Pedicels jointed at the summit. Perianth persistent, of 6 nearly equal distinct linear-oblong somewhat spreading segments. Stamens 6, inserted on the base of the segments and a little shorter; filaments filiform with a somewhat cup-shaped winged and often bicuspidate appendage surrounding the base; anthers oblong, attached near the base but versatile. Ovules several in each cell; style filiform-clavate, persistent and splitting with the capsule. Capsule subglobose, membranous, obtusely 3-lobed, loculicidally dehiscent. Seeds subovoid, angular and wrinkled, black.

1. **B. crocea** (Torr.) Coville. Bulb about 15 cm. in diameter, becoming densely covered with brownish fibres; scape scabrous, 2-5 dm. high; leaf solitary, equaling or exceeding the scape, 6-12 mm. broad; bracts narrowly lanceolate; pedicels numerous, 3-6 cm. long; perianth nearly rotate in bloom; segments 8-12 mm. long; appendages about 2 mm. long, bicuspidate, minutely papillose.

Frequent in the foothills and on the plains. April-June.

6. **DICHELOSTEMMA** Kunth. WILD HYACINTH.

Scape tortuous or twining from a depressed fibrous coated corm. Leaves usually 2, fleshy, linear. Umbel subtended by 3 or more thin spathaceous bracts. Perianth tube thin, more or less inflated and angular or saccate, about equaled by the segments. Stamens 6, the inner with a free lanceolate appendage on each side, sterile in some species, the outer ones naked; anthers basifixed. Ovules 3-8 in each cell; style persistent, with short divergent stigmas. Capsule ovate to oblong, more or less attenuate above. Seeds angled, black.

1. **D. capitata** (Benth.) Wood. Scape 1.5-5 dm. high, very tortuous, not rarely twining; leaves about equaling the scape, carinate; bracts purple, darker than the flowers; flowers several, capitate, clustered on short pedicels 12 mm. long or less; perianth tube funnel-form, shorter than the segments; appendages connivent, forming a corona. (*Brodiaea capitata* Benth.)

Common on the plains and foothills. March-May.

7. **HOOKERA** Salisb.

Scapes erect, straight from a fibrous coated corm, with few linear leaves and a solitary umbel subtended by several membranous bracts. Perianth tube thick turbinate, segments equaling the tube, spreading at the tip. Stamens 3, opposite the inner segments, the outer stamens being reduced to staminodia.

1. **H. minor** (Benth.) Britton. Scape slender, 5–15 cm. high; pedicels 2–5, mostly 2–5 cm. long; perianth about 3 cm. long, violet-purple or paler, its limb rotate, the segments with a strong midvein, the outer narrower, mucronulate; anthers 4–6 mm. long, shorter than the retuse or emarginate staminodia. (*Brodiaea minor* Wats.)

Occasional in heavy soil. March–April.

8. **TRITELEIA** Dougl.

Scapes slender from a fibrous coated corm, with few thin linear leaves and bearing an umbel of yellow, white, blue or purple flowers. Perianth tube rather short or funnellform, not inflated, angular or saccate; the segments erect or spreading. Stamens 6, unappendaged, all antheriferous; anthers versatile or basifixed. Ovary on a slender stipe.

1. **T. laxa** Benth. Scape 3–6 dm. high; umbel 10–30-flowered; pedicels 3–6 cm. long; perianth 3–4 cm. long, funnellform, violet, cleft nearly to the middle; anthers versatile, ovate-lanceolate, 2-lobed at base, bluish or white. (*Brodiaea laxa* Wats.)

On low hills, Los Felis, *Davidson*.

9. **LILIUM** L. LILY.

Tall bulbous herbs, with simple leafy stems and large erect or drooping flowers. Perianth deciduous, funnellform or campanulate, of 6 distinct spreading or recurved segments, each with a nectar-bearing groove at its base within. Stamens 6, mostly shorter than the perianth, slightly attached to the segments; filaments filiform or subulate; anthers linear, versatile. Ovules numerous; style long, somewhat clavate above; stigma 3-lobed. Capsule oblong or obovoid, loculicidally dehiscent. Seeds numerous, flat, packed in 2 rows in each cell.

1. **L. humboltii** Roezl. & Leicht. Bulbs large, 5–15 cm. in diameter, white or purplish; stems stout, purplish, puberulent or glabrous, 15–30 dm. high; leaves usually in 4–6 whorls of 10–20 each, oblanceolate, undulate, 10–15 cm. long, 20–25 mm. wide,

acute, somewhat scabrous or pubescent on the margins and beneath; flowers usually many on short and widely spreading pedicels, 7-15 cm. long or more, scattered; segments 6-10 cm. long, 12-24 mm. broad, reflexed, strongly revolute above the short abruptly narrowed claw, reddish-orange with maroon spots, papillose-rigid toward the base; stamens 4-5 cm. long, about equaling the style; anthers oblong, 8-16 mm. long, red; capsule large, obovoid, acutely 6-angled.

Frequent in canyons of the San Gabriel and Santa Monica Mountains. June-July.

2. **L. parryi** S. Wats. Bulbs small of numerous thick jointed scales, 2.5 cm. long; stems slender, glabrous, 5-8 dm. high; leaves scattered or the lower whorled, linear-lanceolate, 10-15 cm. long; flowers 2-10, pale yellow, inconspicuously dotted, the segments 6-8 cm. long, 10-12 mm. wide, somewhat spreading above or at length recurved at tip; stamens and style shorter; anthers oblong, brownish, 6 mm. long; capsule narrowly oblong, acutish, 4-5 cm. long, 12 mm. wide.

Wet meadows and streambanks in the San Bernardino. One of the most attractive and fragrant California lilies.

10. **FRITILLARIA** L. MISSION BELLS.

Stems erect from scaly bulbs with thick fleshy scales. Leaves scattered or verticillate, mostly narrow and sessile. Flowers solitary or racemose, leafy-bracted, mostly dull-colored, nodding. Perianth campanulate or funnelform, deciduous, of 6 distinct equal oblong-oblong-olate concave segments, more or less blotched or tinged with purple or yellow or white and with a smooth nectariferous pit near the base. Stamens inserted on the base of the segments; filaments slender; anthers oblong, versatile, extrorse, dehiscing laterally. Ovules many; style slender, united to the middle or throughout, deciduous. Capsule membranous, ovate or oblong, 6-angled or winged, loculicidally 3-valved. Seeds flat, in 2 rows in each cell, brownish.

1. **F. biflora** Lindl. Bulb of a few very thick and fleshy ovate scales, 6-10 cm. long; stem usually stout, 15-45 cm. high, 1-3-flowered; leaves 2-6, mostly near the base, somewhat verticillate or scattered, lanceolate or oblong-lanceolate, 5-10 cm. long; perianth dark brownish-purple tinged with green; segments spreading, oblong-lanceolate, about 25 mm. long; stamens 8-10 mm. long; anthers 4 mm. long, mucronate; styles distinct above; stigmas linear; capsule broadly obovoid, somewhat 6-angled, 12-18 cm. long.

Occasional in open places in the foothills. April.

11. **CALOCHORTUS** Pursh. MARIPOSA LILY.

Stems usually flexuous and branching from membranous or rarely fibrous coated corms, with few linear-lanceolate leaves, those of the stems alternate, clasping. Flowers few, showy, terminal on the branches or umbellately fascicled. Perianth deciduous, of 6 distinct more or less concave segments, the inner mostly broadly cuneate-obovate, usually with a conspicuous glandular pit near the base. Stamens 6, inserted on the base of the segments; anthers linear to oblong, basifixed. Ovules many; stigmas sessile, recurved, persistent. Capsule elliptic to oblong.

Petals arched; pedicels slender, drooping.

1. *C. albus*.

Petals not arched; pedicels stout, erect.

2. *C. catalinae*.

Capsule oblong, obtuse at both ends.

Capsule narrowly oblong, attenuate into a beak.

Petals ciliate on the upper margins.

3. *C. weedii*.

Petals not ciliate.

Hairs on the inner surface of petals clavate.

4. *C. clavatus*.

Hairs on the petals not clavate.

Petals with a more or less evident blotch above.

7. *C. venustus*.

Petals not blotched above.

Petals apiculate, sparsely hairy near the gland.

6. *C. invenustus*.

Petals not apiculate, with a hairy zone extending $\frac{1}{3}$ to summit from gland.

5. *C. splendens*.

1. **C. albus** Dougl. Glaucous; stems 15-45 cm. high, mostly branching; bracts foliaceous; flowers subglobose, nodding; sepals shorter than the petals, greenish; petals white, ovate-orbicular, 15-25 mm. long, bearded above the gland with long white hairs; anthers oblong, obtuse, mucronate; capsule 2-5 cm. long, 1-2 cm. wide; seeds pitted.

Common on shady banks in the San Gabriel Mountains.

2. **C. catalinae** Wats. Stems branching, 3-6 dm. high, bulbiferous at base, leaves and bracts linear; sepals ovate-lanceolate, purple-spotted near the base, nearly equaling the petals; petals cuneate-obovate, 3-5 cm. high, lilac, with a large ovate purplish blotch at base; gland oblong, yellow or brown, covered with brown or yellowish hairs; anthers obtuse, pinkish, 5 mm. long, on filaments 3 times as long; capsule 2.5-5 cm. long, about 1 cm. wide.

Common on the plains and in the foothills. Onofree Mountains; Santa Ana Mountains; San Pedro Hills. Extending as far north as the Santa Inez Mountains.

3. **C. weedii** Wats. Stems often much branched above, 3–5 dm. high; bracts linear; sepals oblong with an acuminate tip nearly as long as the petals or exceeding them, yellow, orange-spotted at the base; petals cuneate-obovate, sometimes truncate, 2.5–3.5 cm. long, deep yellow, usually dotted with brown, the upper margin ciliate, densely clothed with hairs at least on the lower two-thirds; anthers about equaling the filaments.

Dry hills in the coast mountains and foothills of San Diego County.

3a. **C. weedii purpurascens** Wats. Like the type as to structural characters, but petals more or less purplish and conspicuously blotched with brown. (*C. weedii vestus* Purdy.)

In the chaparral belt of the coast mountains from the Santa Ana to the Santa Inez Mountains.

4. **C. clavatus** Wats. Stems rather stout, 3–5 dm. high, bulbiferous near the base; bracts linear; sepals ovate-lanceolate, acuminate, about equaling the petals; petals cuneate-obovate, yellow, tinged with brown below, the lower half clothed with long clavate hairs; gland circular, deep, bordered with imbricated scales; anthers purple, obtuse, 8–10 mm. long, about equaling the filaments; capsule narrow, about 5 cm. long.

Santa Monica Mountains; Newhall.

5. **C. splendens** Dougl. Stems single, 3–6 dm. high, usually branched above, bulbiferous at base; sepals lanceolate-acuminate, recurved, yellowish, with an oval purple spot near the base within; petals obovate-cuneate, 3–4 cm. long and of greater width, lilac with a small purplish blotch at base surrounding the densely hairy gland, the lower third sparsely hairy to, but not below, the gland; anthers obtuse, usually shorter than the filaments.

Frequent in the chaparral belt of the San Gabriel and Santa Ana Mountains.

6. **C. invenustus** Greene. Stems 1–4 dm. high, bulbiferous at the base; flowers in a 2–several-flowered umbel; sepals ovate-oblong, shortly acuminate, striate and scarious margined, the tips not recurved, shorter than the petals; petals about 3 cm. long, obovate-cuneate, the rounded summit centrally apiculate, dull white, tinged greenish and purplish, the short claw purplish; gland oblong, covered with light hairs, and with a few scattered hairs near; anthers 5–7 mm. long, obtuse at apex, yellow, on narrowly margined filaments a little shorter, capsule 4 cm. long.

Frequent in the coniferous belt of the San Bernardino Mountains; Mt. Santiago, Santa Ana Mountains.

7. **C. venustus** Dougl. Stem 2–5 dm. high; leaves and bracts narrow; sepals oblong-lanceolate, 3–5 cm. long, acute, about equaling the petals; petals broadly obovate-cuneate, broader than long, white, shaded above with lilac, a conspicuous reddish-purple spot near the summit, a brownish-yellow arch in the center, and a brown base, or these markings sometimes obscure; gland oblong or lunate, densely hairy and surrounded by a few scattered hairs; anthers oblong, obtuse, on dilated filaments of nearly equal length; capsule narrow, 5–7 cm. long.

Open hills about Newhall, *Davidson*.

7a. *C. venustus sulphureus* Purdy. Petals light yellow, with eye in center and a rose-colored blotch at summit.
Newhall, *Davidson*.

12. *HESPEROYUCCA* Baker. SPANISH BAYONET.

Subcaulescent with a short stout woody caudex and straight needle-pointed rough-margined flat leaves and ample panicle. Perianth broadly campanulate, of subequal distinct thin broadly lanceolate concave segments. Filaments evidently adnate to the perianth below, clavate, suberect; anthers didymously cordate. Ovary oblong-ovoid or obovoid, mostly longer than the short slender style; stigma capitate, long-papillate, minutely perforate. Fruit capsular, incompletely 6-celled, 3-valved through the laciniate false septa. Seeds thin, flat.

1. *H. whipplei* (Torr.) Baker. Simple or sometimes caespitose; leaves ascending, rigid, 3-10 dm. long, about 15 mm. wide, plano-convex, subtriquetrous or keeled on both faces, sometimes falcate, striate, glaucous, keenly but finely denticulate, with very fine slender pungent end spine; panicle 2-5 m. high, long peduncled, glabrous; flowers creamy-white, pendent, fragrant, capsule about 5 cm. long. (*Yucca whipplei* Torr.; *Y. whipplei graminifolia* Wood.)

Common in the chaparral belt in all our mountains. June-July.

YUCCA ARBORESCENS (Torr.) Trelease. (JOSHUA TREE.) The large yucca of the Mohave Desert.

13. *ASPARAGUS* L. ASPARAGUS.

Stem at first simple, fleshy scaly, at length much branched, the branchlets filiform and mostly clustered in the axils of the scales and usually flattened. Flowers small, solitary or clustered. Perianth segments all alike. Stamens inserted at the base of the segments; anthers introrse. Ovules 2 in each cell; style slender; stigmas 3, short, recurved. Berry globose.

1. *A. officinalis* L. An escape from cultivation and becoming well established. May.

Family 14. IRIDACEAE. IRIS FAMILY.

Perennial herbs with narrow equitant 2-ranked leaves and perfect regular or irregular mostly clustered flowers subtended by bracts. Perianth of 6 segments or 6 lobes, its tube adnate to the ovary, the segments or lobes in 2 series, convolute in the bud, withering-persistent. Sta-

mens 3, inserted on the perianth opposite the outer series of segments or lobes; filaments filiform, distinct or united; anthers 2-celled, extrorse. Ovary inferior, mostly 3-celled; ovules mostly numerous in each cell; style 3-cleft, its branches sometimes divided. Capsule 3-celled, loculicidally dehiscent, many-seeded.

1. SISYRINCHIUM L. BLUE-EYED GRASS.

Perennial tufted slender herbs with short rootstocks, simple or branched, 2-edged or 2-winged stems, linear grass-like leaves and rather small mostly blue terminal flowers, umbellate from a pair of erect green bracts. Perianth-tube short or none, the segments oblong or obovate, equal, mostly aristulate. Stamens more or less monodelphous. Style branches filiform, undivided, alternate with the anthers. Capsule globose or obovoid. Seeds mostly rounded, smooth or pitted.

1. *S. bellum* Wats. Stems 2-4 dm. high, glabrous or with scabrous margins, with 1-3 floriferous nodes at the summit; peduncles usually 2 at each node; spathes of 2, nearly equal bracts, scabrous on the keel, 4-7-flowered; perianth deep blue-purple with yellowish base, 2 cm. broad or more; stamens united to near the summit; anthers very small; capsule round-obovoid, 6 mm. high; seeds 1.5 mm. thick, obscurely pitted.

Frequent on grassy slopes, both in the valleys and mountains from near sea-level to 6000 feet. April-August.

Family 15. ORCHIDACEAE. ORCHID FAMILY.

Perennial herbs, with corms, bulbs or tuberous roots, sheathing entire leaves sometimes reduced to scales. Flowers perfect, irregular, bracted, solitary, spiked or racemed. Perianth of 6 segments: the outer (*sepals*) similar or nearly so; 2 of the inner ones (*petals*) lateral, alike; the third (*lip*) dissimilar, usually larger, often spurred, sometimes inferior by torsion of the ovary or pedicel. Stamens variously united with the style into an unsymmetrical column; anther (in ours) 2-celled; pollen in 2-8 pear-shaped usually stalked masses (*pollinia*), united by elastic threads, waxy or powdery, attached at

the base to a viscid disk (*gland*). Style often terminating in a beak at the base of the anther or between its sacs; stigma a viscid surface. Ovary inferior, usually long and twisted, 3-angled, 1-celled; ovules numerous, on 3 parietal placentæ. Capsule 3-valved. Seeds numerous, minute, mostly spindle-shaped; endosperm none; embryo fleshy.

Perianth with a spur.

Leaves 2, basal, withering before anthesis. 1. *PIPERIA*.

Leaves several, cauline, not withering until the fruit is set. 2. *LIMNORCHIS*.

Perianth not spurred.

Flowers in a dense twisted spike. 3. *GYROSTACHYS*.

Flowers in a loose leafy-bracted raceme. 4. *EPIPACTUS*.

1. *PIPERIA* Rydb. REIN-ORCHIS.

Somewhat leafy below, the leaves usually withering before anthesis, those of the stem bract-like. Flowers greenish or white; sepals and petals 1-nerved; the upper sepal ovate or lanceolate, erect; the lateral ones spreading, linear to lanceolate, their bases united with the claw of the lip; upper petals free, lanceolate to linear-lanceolate, oblique; the blade of the lip linear-lanceolate to ovate, obtuse, truncate or hastate at the base. Anther-cells parallel, opening nearly laterally. Stigma a small beak in the angle between the anther-cells; ovary sessile, ellipsoid in fruit.

1. *P. lancifolia* Rydb. Stem stout, 3-5 dm. high; basal leaves and lower stem leaves lanceolate, alternate, 10-15 cm. long, 1-2 cm. wide, withering after anthesis; spike many-flowered, lax, 2-3 dm. long; bracts ovate, acute, striate, about $\frac{2}{3}$ as long as the flowers; flowers greenish, 11-13 mm. long; upper sepal ovate, obtuse, about 4 mm. long; blade round-ovate, scarcely at all hastate, thick with prominent medium ridge; spur filiform, slightly clavate, about twice as long as the lip and about equaling the ovary. (*Habenaria unalaschensis* of recent authors, in part, not Spreng.)

Occasional in the canyons of the Santa Monica Mountains, *Hasse*; San Gabriel Mountains. April.

2. *P. longispica* (Durand) Rydb. Stem stout, 3-7 dm. high; basal leaves and lower stem leaves 2-4, lanceolate, acute, 10-15 cm. long, 2-3.5 cm. wide, withering about the time of anthesis; spike many-flowered, rather lax, 1-3 dm. long; bracts ovate-lanceolate, 5-10 mm. long, acuminate; flowers greenish, about 5 mm. long; lateral sepals oblong-lanceolate, obtuse; petals broadly lance-

olate; blade of the lip ovate-hastate, distinctly auricled and truncate at base; spur filiform, 2.5 times as long as the lip.

Santa Monica Mountains, *Hasse*.

2. LIMNORCHIS Rydb.

Perennials from fusiform tubers. Stems leafy, the leaves not withering until the fruit is set. Flowers in loose or more or less condensed spikes. Sepals 3-7-nerved, the lateral free at the base. Petals distinctly 3-nerved; lip flat or concave, without median ridge, not truncate at base, free. Anthers opening in front.

Flowers white, in rather dense spikes.

1. *L. leucostachys*.

Flowers green, loosely scattered.

2. *L. sparsiflora*.

1. *L. leucostachys* (Lindl.) Rydb. Stem stout, 6-10 dm. high; lower leaves oblanceolate, the upper lanceolate; spikes 1-3 dm. long, rather dense; flowers white, 15-20 mm. long; lip lanceolate, about 8 mm. long; spur filiform, about 12 mm. long.

Wet places in mountain meadows and along streams in the San Bernardino and San Jacinto Mountains.

2. *L. sparsiflora* (Wats.) Rydb. Stem slender, 4-6 dm. high; lower leaves oblanceolate, the upper lanceolate; flowers few in a slender loose spike, 2-3 dm. long, light green, about 15 mm. long; lip linear, 8 mm. long, obtuse; spur filiform, about 10 mm. long.

Mountain springs and meadows. Upper San Antonio Canyon, San Gabriel Mountains, *Johnston*, also in the San Bernardino Mountains.

3. GYROSTACHYS Pers. LADIES' TRESSES.

Stems erect, leafy, from a cluster of tuberous roots. Flowers in a twisted spike, white, spurless. Sepals and petals narrow, erect or more or less connivent; lip oblong, sessile or nearly so, the base embracing the column, with a callous protuberance on each side, the dilated summit spreading and usually entire. Column very short oblique, terminating in a short terete spike. Stigma ovate, with an acuminate bifid beak. Anther sessile or nearly so at the base of the stipe behind, acuminate. Pollen-masses 2, thin and powdery.

1. *G. romanzoffiana* (Cham.) MacM. Stems rather stout, glabrous, 1-5 dm. high, bracteate above; leaves oblong-lanceolate to linear; spike dense, 3-ranked, conspicuously bracteate; sepals and petals connivent; lip recurved, ovate-oblong, summit wavy-crenulate; callosities smooth, sometimes obscure; the oblong-linear gland and slender bifid beak 1.5 mm. long; capsule oblong, 6-12 mm. long. (*Spiranthes romanzoffiana* Cham.)

Occasional in canyons in our foothills.

4. **EPIPACTUS** R. Br.

Leafy caulescent herbs from creeping rootstocks. Flowers few, in a terminal leafy-bracted raceme. Perianth spreading; sepals and petals similar; lip free, concave at base, constricted at the middle, dilated and petaloid above. Anther 1, sessile, back of the broad truncate stigma, 2-celled; pollen masses becoming attached to the gland on the small rounded beak of the stigma.

1. **E. giganteum** Dougl. Stems erect, 3–10 dm. high, sparsely pubescent; lower leaves ovate, the upper lanceolate, 8–16 cm. long, acute; flowers on short pedicels, greenish, veined with purple; sepals ovate-lanceolate, 12–16 mm. long.

Springy places in the foothills and mountains.

Family 16. SAURURACEAE. LIZARD-TAIL FAMILY.

Perennial herbs with broad entire alternate petioled leaves and small perfect bracteolate flowers in peduncled spikes. Perianth none. Stamens 6–8 or sometimes fewer, hypogynous; anthers 2-celled, the sacs longitudinally dehiscent. Ovary 3–4-carpelled; the carpels distinct or united, 1–2-ovuled; ovules orthotropous. Fruit capsular or berry-like, composed of 3–4 mostly indehiscent carpels. Seeds globose or ovoid; endosperm copious, mealy; embryo minute, cordate.

1. **ANEMOPSIS** Hook. YERBA MANSE.

Stems nodose, scape-like, stoloniferous from aromatic creeping rootstocks. Leaves mostly radical, minutely punctate. Flowers in a compact spike surrounded at the base by a persistent colored involucre of 5–8 bracts; each flower except the lowest also surrounded by a small colored bract. Stamens 6–8. Ovary sunk in the rachis of the spike, 1-celled; stigmas 3–4. Capsule dehiscent at the apex.

1. **A. californica** H. & A. Stem 15–50 cm. long, with a broadly ovate clasping leaf above the middle and a fascicle of 1–3 small petioled leaves in the axil; basal leaves elliptic-oblong, rounded above, more or less narrowed toward the cordate base, 5–15 cm. long, on petioles 10–20 cm. long; spikes 1.5–4 cm. long; involucre bracts white, often reddish beneath, oblong, 1–3 cm. long; floral

bracts white, obovate, unguiculate, 5-6 mm. long; ovules 6-10 on each placenta.

Frequent in wet saline places throughout our range. March-August.

Family 17. SALICACEAE. WILLOW FAMILY.

Trees or shrubs, with simple alternate stipulate leaves and dioecious flowers in terminal aments. Each flower subtended by a scale-like bract. Perianth none. Stamens 2-several, central or scattered on a glandular disk. Ovary 1-celled; stigmas 2-4. Fruit a 2-4-valved capsule, with numerous comose seeds.

Bracts fimbriate or incised; stamens numerous; stigmas elongated.

1. *POPULUS*.

Bracts entire; stigmas short.

2. *SALIX*.

1. *POPULUS* L. POPLAR or COTTONWOOD.

Trees with scaly resinous buds, terete or angled twigs, and broad or narrow, usually petioled leaves, the stipules minute, fugacious. Bracts of the aments fimbriate or incised. Disk cup-shaped, oblique, lobed or entire. Staminate aments dense, pendulous, their flowers with 4-60 stamens, with distinct filaments. Pistillate aments pendulous, erect or spreading. Ovary sessile; style short; stigmas 2-4, entire or 4-lobed. Capsule 2-4-valved. Coma of the seeds often very long and copious.

1. *P. trichocarpa* T. & G. Tree with a broad head of ascending branches, 8-15 m. high; leaves ovate or oblong-ovate, rounded at base, acute at apex, serrulate, dark green and shining above, pale beneath, 5-8 cm. long, on terete petioles, 3-5 cm. long; staminate aments 3-5 cm. long; disk oblique, bearing 40-60 stamens, with purple anthers; pistillate aments 5-7 cm. long, loosely flowered; ovary hoary tomentose; capsule 3-valved.

Frequent in the canyons of all our mountains and sometimes extending down into the valleys. March.

2. *P. fremonti* Wats. Tree with a broad head of wide-spreading branches, 6-15 m. high; leaves deltoid-orbicular, 4-10 cm. long, somewhat broader; crenate or sinuate-crenate, abruptly acute at apex, truncate or subcordate at base, green or yellowish-green on both surfaces; staminate aments 25-35 mm. long; stamens 60 or more, with dark red anthers; pistillate aments 5 cm. long, loosely flowered; ovary glabrous; capsule on pedicels 4 mm. long, minutely rough-tuberculate.

Rare within our limits. Fernando. Common in the San Bernardino Valley, and in San Diego County south of the San Luis Rey River.

2. *SALIX* L. WILLOW.

Trees or shrubs with mostly long narrow usually acute leaves, and persistent or early deciduous broad or minute stipules. Bracts entire or denticulate. Disk gland-like, small or minute. Staminate aments dense, erect, spreading or drooping, their flowers with 1-11 stamens with filaments distinct or sometimes united below. Pistillate usually erect or spreading; ovary sessile or short-stipitate; style short or filiform, with 2 entire or 2-cleft stigmas. Capsule mostly 2-valved.

Stamens 3 or more; aments terminating leafy branchlets.

Leaves green on both surfaces.

1. *S. nigra vallicola*.

Leaves glaucous beneath.

Petioles with 2 or more prominent glands at the base of the blade.

2. *S. lasiandra*.

Petioles without glands.

3. *S. laevigata*.

Stamens 2.

Aments subsessile on leafless peduncles, appearing before the leaves in early spring.

Capsule glabrous.

4. *S. lasiolepis*.

Capsule hairy.

5. *S. scouleriana*.

Aments terminating leafy branchlets, appearing after the leaves.

Stigmas sessile.

Leaves green, sparsely silky-pubescent; stigmas short and thick.

6. *S. exigua*.

Leaves silvery, densely silky-pubescent; stigmas oblong, about twice as long as thick.

7. *S. argophylla*.

Stigmas on an evident style; leaves silky.

8. *S. macrostachya*.

1. *S. nigra vallicola* Dudley. Tree 8-12 m. high, with dark, rough bark; leaves green on both surfaces, glabrate, narrowly lanceolate, 5-12 cm. long, 8-12 mm. wide, closely serrulate, acute or acuminate, narrowed at base to petioles 4-6 mm. long, which are quite puberulent or nearly glabrous at maturity; stipules lanceolate when well developed, the larger 8-10 mm. long, all glandular toothed, often with similar glands on the lower surface and on the serratures of the young leaves; aments expanding with the leaves, terminating the short lateral branches, the staminate 3-6 cm., the pistillate 2.5-5 cm. long; stamens 5-11, their filaments tomentose below; bracts pale, obovate or roundish, usually very tomentose; style short; stigmas 2, lobed; capsule ovoid, glabrous or more or less pubescent, mostly 4-5 mm. long, from slightly longer to twice the length of the smooth pedicels.

The largest willow in southern California. Frequent along the Santa Ana River from Santa Ana to San Bernardino; also along the San Dieguito and San Diego Rivers in San Diego County.

2. *S. lasiandra* Benth. A middle-sized tree with rough bark; leaves rather broadly lanceolate, 7–15 cm. long, abruptly tapering at the base, acuminate at apex, sharply and closely serrulate, pale beneath; petioles glandular at the base of the blade; stipules small, glandular-serrate; aments on long peduncles, the pistillate 5–7 cm. long; bracts of the staminate yellowish, toothed; stamens usually 5; ovary glabrous; stigma nearly sessile, bifid; capsule lanceolate, 6–8 mm. long, on pedicels 2 mm. long.

Occasional along streams in the valleys. Los Angeles River, near Cahuenga Pass. A form with smaller leaves and aments is apparently frequent along all the streams in the valleys; it is near the type, but the petioles and stipules are inconspicuously glandular.

3. *S. laevigata* Bebb. Tree 10–15 m. high; branches reddish-brown; leaves lanceolate to oblong-lanceolate, serrulate, green and shining above, more or less glaucous beneath, 8–12 cm. long, glabrous; petioles about 1 cm. long; puberulent above and somewhat grooved; staminate aments usually flexuose, 5–7.5 cm. long; bracts more or less elliptic, woolly at base, glabrous and pallid towards the apex; stamens 5–6; filaments pubescent below; capsule conic from a thick base, acute, glabrous, on pedicels 3–4 times as long as the gland; stigma nearly or quite sessile, emarginate.

Frequent along all streams, especially in the canyons.

4. *S. lasiolepis* Benth. Tree or large shrub, 4–8 m. high; leaves oblong or somewhat broadest above the middle, obscurely and irregularly serrulate, dull green above, more or less gray-pubescent beneath, 12–20 mm. broad, 5–7 cm. long, on petioles 5–10 mm. long; aments appearing before the leaves, suberect; the staminate 2–4 cm. long; stamens 2; pistillate 2.5 cm. long or less; capsule acute, smooth, short pedicelled; styles rather short; stigmas erect.

The most common willow, covering a considerable area along the Santa Ana and San Gabriel Rivers toward the coast.

5. *S. scouleriana* Barr. Small tree, 4–10 m. high, with dull gray bark; leaves variable, mostly narrowly obovate, obtuse at the apex and cuneate at base, 3–12 cm. long, entire or shallowly serrulate, dark green and glabrous above, pale beneath and usually rusty pubescent; stipules ear-shaped, denticulate; aments densely flowered, appearing before the leaves, 2–5 cm. long; capsules tomentose; stigmas sessile, long; scales obovate; black, long-hairy; filaments free, glabrous.

Borders of mountain streams and meadows; San Bernardino Mountains, but not reported from the San Gabriel.

6. *S. exigua* Nutt. Small shrub or becoming a small tree; branches light brown; leaves 4 cm. long, 1–2 cm. wide, yellowish, closely sessile, entire or nearly so, canescent when young, usually becoming quite glabrous at maturity, very narrowly elliptic, veins very indistinct; stipules none; aments 2–5 cm. long, on peduncles about the same length, appearing with the leaves, rather densely and evenly flowered, sometimes the lower flowers remote; scales in the staminate ament oblong to obovate, in the pistillate narrower and longer, smooth or more or less crisp villous on the margins; capsule closely sessile, lanceolate, glabrous, light green; stigmas

short and thick, sessile, sometimes even appearing slightly sunken in the apex of the capsule.

In the interior valleys, and desert regions.

7. *S. argophylla* Nutt. Tree or large shrub forming clumps, young twigs puberulent, branches nearly glabrous and very tough; bark turning from brown to yellow or orange before blooming; leaves narrowly lanceolate, 5 cm. long, 1–2 cm. wide, closely sessile, entire or rarely minutely and remotely denticulate, clothed equally on both sides with an appressed silky pubescence; stipules none or very minute on vigorous shoots; aments surpassed by their leafy peduncles, 3–5 cm. long, 1–2 cm. thick, often in pairs or in 3's at the ends of the branches; scales oblong, obtuse in the staminate aments, narrower and more acute in the pistillate, glabrous on the back, crisp hairy on the margin and toward the base, erose above; lower half of the filament densely crisp hairy; capsule lanceolate, covered with straight appressed silky hairs, closely sessile; stigmas sessile, oblong, about twice as long as thick; mature capsule often becoming nearly glabrous.

Mostly east of our limits in dry washes.

8. *S. macrostachya* Nutt. Shrub or small tree, 1–6 m. high, often in dense thickets; bark light brown, cinereous, young branches villous; leaves 5 cm. long, 1 cm. wide, sessile or nearly so, oblanceolate or narrowly elliptic, acute at both ends, more or less villous-pubescent; stipules none; aments on short leafy lateral branches, 2–3 cm. long, densely flowered, oblong; scales densely villous all over, oblong; filaments crisp villous upon the lower half; capsules clothed with long lax hairs, closely sessile; style evident; stigmas divided, linear.

Common along streams and washes throughout the valley region

Family 18. MYRICACEAE. BAYBERRY FAMILY.

Shrubs or trees with alternate, mostly coriaceous and aromatic simple leaves and small monoecious or dioecious flowers, in linear, oblong or globular, bracted aments. Flowers solitary in the axils of the bracts. Perianth none. Staminate flower with 2–16 (usually 4–8) stamens, inserted on the receptacle; filaments short, distinct or somewhat united; anthers ovate, 2-celled, dehiscing by a longitudinal slit. Pistillate flowers with a solitary, 1-celled ovary, subtended by 2–8 bractlets; ovule solitary, orthotropous; style very short; stigmas 2, linear. Fruit a small oblong drupe or nut, the exocarp often waxy. Seed erect; endosperm none.

1. *MYRICA* L. WAX MYRTLE.

Shrubs or small trees, with entire, dentate or lobed mostly resinous-dotted leaves, monoecious or dioecious. Staminate aments oblong or narrowly cylindric; stamens 4-8. Pistillate aments ovoid or subglobose; ovary subtended by 2-4 short bractlets. Fruit globose, waxy.

1. *M. californica* C. & S. Thickly branched evergreen shrub, 2-3 m. high; leaves thick, glabrous, oblong or oblanceolate, tapering to an acute apex, narrowed below to a short petiole, 6-12 cm. long, remotely serrate or nearly entire; flowers monoecious; staminate aments below the pistillate, 2 cm. long or less; stamens 7-16, united by their filaments; bractlets 2, narrowly oblong, hairy at apex; pistillate aments in the axils of the upper leaves, 6-10 mm. long; ovary ovate, with 2 exserted styles, red; bractlets minute; fruit brownish-purple, covered with a whitish wax, 4 mm. in diameter.

Rustic Canyon near Santa Monica, *Hasse*.

Family 19. JUGLANDACEAE. WALNUT FAMILY.

Trees or shrubs, with alternate pinnately compound leaves and monoecious bracteolate flowers, the staminate in long drooping aments, the pistillate solitary or several together. Staminate flower consisting of 3-numerous stamens, with or without an irregularly lobed perianth adnate to the bractlet. Anthers erect, 2-celled, dehiscent by a longitudinal slit; filaments short. Pistillate flowers bracted and usually 2-bracteolate, with a 3-5-lobed (usually 4-lobed) calyx, or without both calyx and petals. Ovary inferior, 1-celled or incompletely 2-4-celled; ovules solitary, erect, orthotropus; styles 2. Fruit in ours a drupe, with indehiscent, fibrous woody exocarp, enclosing the bony endocarp or nut, which is incompletely 2-4-celled. Seed large, 2-4-lobed; endosperm none; cotyledons corrugated, oily.

1. *JUGLANS* L. WALNUT.

Trees or large shrubs, with a somewhat resinous-aromatic bark and foliage, superposed buds and odd-pinnate leaves, with nearly or quite sessile leaflets. Staminate flowers borne on the twigs of the previous year; perianth 3-6-lobed; stamens 8-40, in 2 or more series. Pistil-

late flowers solitary or several together on a terminal peduncle at the end of shoots of the season; calyx 4-lobed, with 4 small petals adnate to the ovary at the sinuses; styles fimbriate, very short. Drupe large, globose or ovoid, the exocarp somewhat fleshy, the endocarp rugose or sculptured, 2-4-celled at the base.

1. *J. californica* Wats. Arborescent shrub growing in clumps, 5 m. high, or rarely a tree and attaining a height of 15 m., more or less tomentose, sometimes nearly glabrous; leaves 15-25 cm. long; leaflets 11-17, oblong-lanceolate, serrate, 4-6 cm. long; aments often in pairs, 7-12 cm. long; perianth of staminate flowers 3 mm. long; stamens 30-40; drupe globose, slightly compressed, 1.5-2.5 cm. in diameter; nut shallowly sulcate.

Confined mostly to the foothills below 3000 feet. Frequent in the Santa Monica Mountains and Puente Hills, less so on the southern borders of the San Gabriel, San Bernardino and Santa Ana Mountains.

Family 20. BETULACEAE. BIRCH FAMILY.

Monoecious trees or shrubs, with alternate petioled simple leaves and small flowers in aments. Staminate aments pendulous, with 1-3 flowers in the axils of each bract, consisting of a membranous 2-4-parted calyx or none, and 1-10 stamens. Pistillate aments erect or drooping, spike-like or capitate, their flowers with or without a calyx adnate to the solitary 1-2-celled ovary; style 2-cleft; ovules 1-2 in each cell, pendulous. Fruit a small compound or ovoid-globose nut or samara. Endosperm none; cotyledons fleshy.

1. *ALNUS* Gaertn. ALDER.

Shrubs or trees with dentate or serrulate leaves, and both pistillate and staminate flowers in aments; the staminate pendulous; the pistillate erect, clustered. Staminate flowers 3-6 in each axil, consisting of a mostly 4-parted perianth, 1-4 stamens and subtended by 2-4 minute bractlets; ovary 2-celled; bracts woody, persistent, 5-toothed or erose. Nut small, compressed, winged or wingless.

1. *A. rhombifolia* Nutt. Tree 7-14 m. high, with a light gray trunk; leaves narrowly or broadly ovate to elliptic, 2.5-10 cm. long, irregularly serrulate, somewhat pubescent beneath; staminate

aments 7–15 cm. long; bracts obtuse; stamens usually 2 (1–3); pistillate aments 4–6 mm. long; cones broadly oblong, 12–20 mm. long; seeds acutely margined.

Common along mountain streams and occasionally extending down into the valleys. January.

Family 21. FAGACEAE. BEECH FAMILY.

Trees or shrubs with evergreen or deciduous alternate petioled leaves and small monoecious flowers, the staminate in pendulous erect or spreading aments, the pistillate solitary or several together, subtended by an involucre of more or less united bracts, which becomes a bur or cup. Petals none. Staminate flowers with a 4–7-lobed perianth and 4–20 stamens; filaments slender, distinct; anther sacs longitudinally dehiscent. Pistillate flowers with a 4–8-lobed urn-shaped or oblong perianth, adnate to the 3–7-celled ovary; ovules 1–2 in each cell, only 1 in each ovary maturing, pendulous, anatropous; styles as many as cells to the ovary, linear. Fruit a 1-seeded nut, with coriaceous or bony exocarp. Endosperm none; cotyledons large, fleshy.

Involucre 1–3-flowered, becoming a spiny bur in fruit.

1. *CASTANOPSIS*.

Involucre 1-flowered; fruit an acorn.

2. *QUERCUS*.

1. *CASTANOPSIS* Spach. CHINQUAPIN.

Evergreen trees or shrubs with rather soft close-grained wood. Staminate aments long, slender and erect, the flowers arranged in clusters of 3; stamens 10–12. Pistillate flowers 1–3 in an involucre, in short aments or at the base of the staminate aments; calyx 6-cleft; ovary 3-celled with 2 ovules in each cell; styles 3. Fruit maturing the second autumn, the spiny bur enclosing 1–3 nuts. Nuts ovoid or globose, more or less angled, usually 1-seeded.

1. *C. sempervirens* (Kell.) Dudley. A spreading shrub, 1–2.5 m. high, with smooth brown bark; leaves oblong, usually obtuse at apex and acute at base, 4–8 cm. long, light yellow or grayish green above, golden or pale rusty tomentose beneath.

A common shrub in the coniferous forests of the Sierra Nevada.

In southern California it grows usually above 8000 feet altitude in the San Gabriel and San Bernardino Mountains.

2. QUERCUS L. OAK.

Trees or shrubs with persistent or deciduous leaves and small green or yellowish monoecious flowers, the staminate numerous in slender mostly drooping aments, the pistillate solitary in many-bracted involucre. Staminate flowers subtended by caducous bracts, consisting of mostly a 6-lobed campanulate perianth and 5–12 stamens with filiform filaments. Pistillate with an urn-shaped or oblong 3-celled ovary; ovules 2 in each cell; styles usually 3, short. Fruit (acorn) consisting of the imbricated and more or less united bracts of the involucre (cup), subtending or nearly enclosing the 1-seeded coriaceous nut.

Bark not scaly, smooth or on old trunks irregularly ruptured; stigmas on slender styles; scales of the cup thin and closely imbricated; nut tomentose on the inner surface.

BLACK OAKS.

Leaves deciduous, large and divided into bristle-tipped lobes.

1. *Q. kelloggii*.

Leaves evergreen, small and coriaceous.

Acorns maturing the second autumn; leaves plane, bright yellow-green and glabrous beneath.

2. *Q. wislizenii*.

Acorns maturing the first autumn; leaves convex, pale beneath with tufts of hairs in the axils of the principal veins.

3. *Q. agrifolia*.

Bark scaly, and on large trees usually furrowed; stigmas broad and nearly or quite sessile; cups usually with tuberculate scales.

WHITE OAKS.

Acorns maturing the second autumn; nuts tomentose on the inner surface; leaves evergreen.

4. *Q. chrysolepis*.

Acorns maturing the first autumn.

Leaves deciduous, more or less lobed.

Leaves dark green above, deeply lobed.

5. *Q. lobata*.

Leaves blue green above; shallowly lobed or merely wavy margined.

6. *Q. douglasii*.

Leaves evergreen.

Trees with shallowly furrowed bark.

7. *Q. engelmanni*.

Shrubs; bark covered with loose scales.

8. *Q. dumosa*.

1. *Q. kelloggii* Newb. A handsome tree 15–30 m. high, with a trunk 1–1.5 m. in diameter; bark smooth, divided into broad ridges

near the base of old trunks; leaves deciduous, 6–15 cm. long, deeply parted into about 3 lobes on a side, each lobe with 1–4 coarse bristletipped teeth, bright green shining and glabrous above or sometimes pubescent, paler beneath; nut deeply set in the cup, 2.5–3 cm. long, 2 cm. thick; scales thin, chestnut brown

A common oak in the coniferous forests of the San Bernardino, San Jacinto and Cuyamaca Mountains, but in the San Gabriel it is apparently restricted to the more inland ranges, as North Baldy and Swarthout Valley.

2. *Q. wislizenii* A. DC. A spreading shrub or a small tree with us; leaves persistent, coriaceous, lanceolate or oblong-lanceolate, acute, entire or somewhat spinose-dentate, usually plane, green on both faces, glabrous; acorns biennial; nuts narrow as in the last; cup turbinate, very deep.

Frequent in the chaparral belt of all the southern California mountains except the Santa Monica Range.

3. *Q. agrifolia* Nee. (LIVE OAK, ENCINA.) Large, widely spreading tree; leaves persistent, oval to oblong, 4–7 cm. long, sinuately spinose-dentate, somewhat stellate pubescent when young, in age mostly convex above, pale and nearly glabrous beneath; acorns annual, sessile or nearly so; nut narrow and tapering, 2–3 cm. long, 6–8 mm. wide; cup turbinate, rather deep with lanceolate slightly pubescent brown scales.

The common oak of the valleys and foothills.

4. *Q. chrysolepis* Liebm. (CANYON OAK.) Usually a large tree; leaves evergreen, oblong, acute or cuspidate, obtuse or subcordate at base, usually entire or spinose-denticulate, pale and glaucous green above, more or less fulvous-tomentose beneath, becoming glabrate in age; acorns variable in size; nut oval, obtuse, 15–30 mm. long; cup hemispheric, very thick, its scales usually almost hidden by fulvous tomentum, 1–3 cm. broad.

Common in the canyons of all our mountains above 2500 feet.

5. *Q. lobata* Nee. (VALLEY OAK, ROBLE.) Stately tree with slender, often long and pendulous branches; leaves oblong or obovate, 6–12 cm. long, deeply lobed or pinnatifid, pale green, acorns subsessile; nut long-conic, 3–6 cm. long; cup deep-hemispheric, strongly tuberculate.

Chatsworth Park and San Fernando. A single tree has also been observed near Santa Monica (*Hasse*) and another near Lamanda Park by the author, which is the southern limit of this oak as far as known.

6. *Q. douglasii* H. & A. (BLUE OAK.) Middle-sized tree with rounded head, branches numerous, erect-spreading; leaves deciduous, 5–6 cm. long, oblong, sinuate or with shallow lobes, bluish-green above, pubescent beneath; acorn sessile or short peduncled; nut elongated-oblong, 2–3 cm. long, mostly acutish; cup hemispheric, with ovate-lanceolate, thick or somewhat tubercled scales.

The Blue oak reaches its southern limit along the western edge of Antelope Valley a few miles south of Tejon Pass.

7. *Q. engelmanni* Greene. A middle-sized tree, 8–15 m. high,

with light colored and rather smooth bark, trunk often 6-10 dm. thick, branches spreading to form a well rounded scarcely depressed head; leaves short-petioled, oblong, 5-8 cm. long, entire or sometimes with a few coarse teeth, obtuse or retuse at the apex, rounded or slightly cordate at the base, those of young shoots sometimes acutish at both ends and coarsely serrate-toothed throughout, somewhat coriaceous, almost without reticulation, downy-pubescent when young, becoming glabrous in age; acorns sessile or peduncled; cup hemispheric, tuberculate; nut oblong, about 2 cm. long.

Frequent from Altedena and Alhambra to Monrovia; also occurring at Azusa and Glendora, as well as in the foothills of San Diego County.

8. *Q. dumosa* Nutt. Shrub 1.5-5 m. high, the slender branches tomentose when young; leaves coriaceous, sometimes persistent, 2 cm. long or more, oblong, obtuse, sinuate or sinuate-toothed, dark green above, pubescent beneath; acorns sessile; nut oval, 2-3 cm. long; cup deep-hemispheric, 1-2 cm. broad, usually strongly tuberculate, occasionally with somewhat flattened scales.

Common in the chaparral belt of all the mountains. What seem to be hybrids between this and *Q. engelmanni* are not infrequent wherever the range of these two approach each other.

Two species of oak grow on Santa Catalina that are not found on the mainland. *Q. tomentella* Engelm. is related to *chrysolepis*, but may be distinguished by the larger leaves which have prominent parallel lateral veins. *Q. macdonaldii* Greene has deciduous leaves that are deeply lobed; it is a small tree with finely checked bark.

Family 22. URTICACEAE. NETTLE FAMILY.

Ours annual or perennial herbs, with mostly stipulate simple leaves and often with stinging hairs. Flowers in racemed or paniced cymes (ament-like), with small persistent bracts, monoecious or polygamous, small, greenish. Petals none. Calyx mostly 4-parted or sepals distinct, with as many stamens opposite the lobes; filaments inflexed and anthers reversed in the bud, straightening elastically at anthesis. Ovary superior, 1-celled, 1-ovuled; style and stigma 1. Fruit an achene. Endosperm oily, not copious; embryo straight.

Herbs with stinging hairs; leaves opposite.

Sepals 4, distinct.

Staminate calyx 4-parted; pistillate unequally 2-4-toothed.

Herbs without stinging hairs; leaves alternate.

1. URTICA.

2. HESPEROCNIDE.

3. PARIETARIA.

1. *URTICA* L. NETTLE.

Annual or perennial, simple or branching herbs, with stinging hairs, and opposite 3-7-nerved petioled serrate or dentate stipulate leaves. Flowers clustered in axillary geminate racemes or heads. Staminate flowers 4-merous. Pistillate calyx with unequal sepals, the inner larger and at length enclosing the flattened achene. Stigma sessile, tufted.

1. *U. urens* L. Erect, branching from the base or sometimes simple, 25-50 cm. high; leaves ovate or oblong-ovate, deeply and sometimes doubly serrate, 1-4 cm. long, on slender petioles of about the same length; stipules 4 mm. long; flower clusters rather dense, mostly shorter than the petioles; flowers androgynous, mainly pistillate.

Common in gardens and waste places. Native of Europe.

2. *U. holosericea* Nutt. Stems simple, stout, 1-3 m. high or more, more or less bristly and finely pubescent; leaves finely and densely pubescent beneath, less so above or with only a few scattering bristles, ovate to lanceolate, 5-10 cm. long, the upper much shorter, on petioles $\frac{1}{4}$ as long, coarsely serrate; stipules narrowly oblong, acute or obtuse, 6-10 mm. long; staminate flower clusters rather loose, nearly equaling the leaves; pistillate denser and shorter; inner sepals ovate, densely hispid, 1 mm. long, about equaling the broadly ovate achene.

Very common along streams and in low ground in the valleys and the lower altitudes of the mountains. May-September.

2. *HESPEROCNIDE* Torr. WESTERN NETTLE.

Annual herbs distinguished from *Urtica* by the pistillate perianth, which is a membranous flattened oblong-ovate sac, with a minutely 2-4-toothed orifice.

1. *H. tenella* Torr. Slender and weak, 25-50 cm. high, simple or branched, somewhat hispid with branching hairs and bristly; leaves 1-3 cm. long, thin, ovate, obtusely serrate; petioles slender, $\frac{1}{2}$ as long; flower clusters rather dense, nearly glomerate, shorter than the petioles; calyx thin, hispid, with hooked hairs, in fruit 1-1.5 mm. long; achene membranous, striately tuberculate with minutely rough points.

Sepulveda Canyon, Santa Monica Mountains; San Pedro Hills; also near San Diego and on Catalina Island.

3. *PARIETARIA* L.

Ours slender annuals without stinging hairs. Leaves alternate, entire, 3-nerved, petioled, without stipules. Flowers in axillary glomerate clusters, polygamous, subtended by leafy bracts. Calyx of the perfect flowers

4-parted, in the pistillate tubular-ventricose, 4-cleft with connivent lobes. Style slender or none; stigma spatulate, recurved, densely tufted. Achene ovoid, smooth and shining, enclosed in the dry brownish nerved calyx.

1. *P. debilis* Forst. Very slender, usually diffusely branching from the base, 10–25 cm. high, somewhat hispid; leaves 5–10 mm. long or more, broadly ovate, obtuse, rounded at the base or abruptly cuneate; petioles slender, about equaling the leaves; achene 1 mm. long.

Growing in moist shady places, especially in the chaparral belt. Santa Monica Mountains; Verdugo Hills; Santa Ana Mountains.

Family 23. LORANTHACEAE. MISTLETOE FAMILY.

Evergreen shrubs or herbs, ours parasitic on shrubs or trees and absorbing food from their sap through specialized roots (haustoria). Stems dichotomously branched, swollen at the joints and bearing opposite thick coriaceous entire exstipulate leaves, foliaceous or reduced to connate scales. Flowers dioecious, regular, clustered or solitary, small and greenish. Petals none. Calyx-tube adnate to the ovary, 2–5-lobed. Stamens equaling the calyx-lobes and inserted upon them; anthers 2-celled or confluent 1-celled. Ovary inferior, 1-celled, 1-ovuled; style simple or none; stigma 1. Fruit a berry; seed solitary with glutinous testa and copious endosperm; embryo straight, terete or angled.

Leaves scale-like; anthers 1-celled; pollen spinulose.

1. RAZOUMOFSKYA

Leaves foliaceous; anthers 2-celled; pollen smooth.

2. PHORADENDRON.

1. RAZOUMOFSKYA Hoffm.

Plants yellow or greenish-brown with fragile jointed angled stems. Leaves reduced to opposite connate scales. Flowers solitary or several from the same axil. Staminate flowers mostly 3-parted, compressed. Anthers sessile on the lobes, circular, 1-celled, dehiscent at the base by a circular slit; pollen grains spinulose. Pistillate flowers ovate, compressed, 2-toothed, subsessile, at length exserted on reflexed pedicels. Berry fleshy,

compressed, dehiscing elastically at the circumscissile base. Cotyledons very short.

1. *R. occidentalis* (Engelm.) Kuntze. Stems much branched, 5–15 cm. long, 3–5 mm. thick; staminate plants brownish-yellow, bearing numerous dense spikes, many-flowered; calyx-lobes 3–4 mm. long, lanceolate, acuminate; pistillate plants olive-brown; spikes short, 5–6-flowered or with the upper reduced to 1; berry brown, oblong, tapering to each end, 4–5 mm. long. (*Arceuthobium occidentale* Engelm.)

Frequent on pines.

2. PHORADENDRON Nutt. MISTLETOE.

Woody plants with terete usually jointed and brittle stems. Leaves foliaceous, entire, faintly nerved, or reduced to connate scales. Flowers sunk in the jointed rachis, usually several in the axil of each bract. Staminate flowers with a mostly 3-lobed globose calyx, bearing a sessile transversely 2-celled anther at the base of each lobe. Pistillate flowers with a similar calyx adnate to the inferior ovary. Berry sessile, ovoid or globose, fleshy.

1. *P. villosum* Nutt. Foliage deep green; leaves elliptic, obtuse, 3-nerved, pubescent, 2–2.5 cm. long, on short petioles; berries pinkish, 3 mm. in diameter.

On oaks about Pasadena.

2. *P. macrophyllum* (Engelm.) Cockerell. Foliage deep green; leaves orbicular-ovate, 5–7 cm. long, usually 5-nerved; spikes large; flowers pubescent.

Common on the sycamores.

Family 24. POLYGONACEAE. BUCKWHEAT FAMILY.

Herbs or rarely shrubs, with alternate or verticillate leaves, which are often only radical, with sheathing stipules or none. Flowers mostly perfect, on jointed pedicels. Calyx of 4–9 sepals, usually petaloid, persistent. Stamens as many as the sepals, perigynous. Styles 2–4, distinct or somewhat united, opposite the angles of the lenticular or triquetrous achene. Seed erect; embryo straight within the mealy endosperm or curved around it.

Leaves without stipules.

Involucre of distinct bracts or wanting.

Bracts present.

Flowers solitary, surrounded by a 2-lobed bract, becoming enlarged in fruit.

Flowers capitate, each surrounded by a bract.

Bracts wanting: calyx involucre-like.

Involucre turbinate to campanulate, toothed or lobed.

Teeth of the involucre cuspidate or awned.

Involucre tubular, 5-6-toothed, usually with hooked awns, and usually 1-flowered.

Involucre turbinate or campanulate, deeply lobed: awns straight: flowers 2-many.

Involucre turbinate, with 18-20 acicular awns.

Involucre deeply 3-5 cleft, the lobes ending in straight awns or awnless.

Teeth of the involucre 3-8, not awned.

Leaves with sheathing stipules.

Sepals 6, the outer 3 smaller; stigmas tufted.

Sepals 4-5, similar; stigmas capitate.

1. PTEROSTEGIA.

2. NEMACAULIS.

3. LASTARRIAEA.

4. CHORIZANTHE.

5. ACANTHOCYPHUS.

6. OXYTHECA.

7. ERIOGONUM.

8. RUMEX.

9. POLYGONUM.

1. PTEROSTEGIA F. & M.

Very slender annuals, diffusely dichotomous from the base, with opposite leaves and foliaceous bracts. Involucres axillary, sessile, solitary, consisting of a single 2-lobed bract, shorter than the solitary sessile flower, enlarged in fruit, scarious and reticulated, loosely enclosing the achene, gibbously 2-saccate on the back. Calyx 6-parted or rarely 5-parted. Stamens 3-6, inserted at the base of the calyx-lobes. Achene triangular, glabrous; cotyledons accumbent.

1. *P. drymarioides* F. & M. Stems several from the base, 10-30 cm. long or more; lower leaves petioled, 4-12 mm. long, fan-shaped, 2-lobed, the lobes crenately toothed or slightly lobed; upper leaves obovate-spatulate, entire or more or less toothed; bracts similar, 2 mm. long; involucres 2-3 mm. long in fruit, the margins of the lobes toothed or lacinate; flowers about 1.5 mm. long, sessile; calyx-lobes lanceolate.

Common and general below 4000 feet. The whole plant often reddish when growing in exposed places.

2. NEMACAULIS Nutt.

Slender diffuse annuals with spatulate mostly radical leaves and no stipules. Flowers capitate, each with a free herbaceous bract, perfect. Calyx 6-cleft, colored, enclosing the achene. Stamens 3. Styles 3; stigmas capitate. Achene short-ovoid, obscurely 3-angled.

1. *N. denudata* Nutt. Stems prostrate or ascending, 15–30 cm. long, glabrate, reddish; leaves narrowly spatulate, 2–5 cm. long, including the short petiole, densely tomentose-hairy on both sides; bractlets of the flower clusters obovate-spatulate, 2 mm. long, the outer flowerless, the inner smaller, woolly within and glabrous without; flowers yellowish, scarcely 1 mm. long, short pedicellate, glabrous; inner segments broadest; achene 0.7 mm. long. (*N. nuttallii* Benth.)

Occasional on sand-dunes along the seashore and in sandy soils in interior valleys.

3. LASTARRIAEA Remy.

A small diffuse rigid fragile annual, with the aspect of *Chorizanthe*. Involucre wanting. Perianth involucre-like, coriaceous, tubular, 5–6-cleft to the middle; the narrow teeth rigid, awned, recurved and uncinat. Stamens 3, inserted on the throat; filaments very short, with small membranous appendages intervening at their insertions. Achene triangular; embryo curved.

1. *L. chilensis* Remy. Branches procumbent or ascending, 5–15 cm. long, hirsute; lowest leaves linear, obtuse, hispid-ciliate, 1–2 cm. long, cauline in whorls of 4–5, unequal; bracts 3–6 mm. long, concealing the flowers; perianth 2–3 mm. long, its tube triquetrous; teeth 5, 3 long and 2 short; anthers small, orbicular; style very short.

Occasional on dry hillsides, especially in sandy soils. April.

4. CHORIZANTHE R. Br.

Low dichotomously branched annual herbs, with rosulate basal leaves and opposite or ternate stem-leaves, often reduced and bracteate. Involucre 1-flowered, or rarely 2–3-flowered, tubular or funnellform, sessile, 3–6-angled or costate, 3–6-toothed or 3–6-cleft, its teeth divaricate, cuspidate or awned. Flowers pedicellate or nearly sessile, included within the involucre, or the segments protruding. Calyx 6-parted or 6-cleft, colored. Stamens usually 9, rarely 3 or 6, adnate to the base of the calyx-tube. Ovary glabrous.

Stems glabrous or glandular.

Leaves glabrous, slightly ciliate on the margins.

Involucres glabrous.

Involucres hirsute.

Leaves hirsute.

1. *C. thurberi*.

2. *C. leptoceras*.

3. *C. californica*.

Stems villous pubescent or hirsute, not glandular.

Bracts not foliaceous.

Leaves tomentose beneath.

Leaves not tomentose beneath.

4. *C. staticoides*.

5. *C. procumbens*.

Bracts more or less foliaceous.

Procumbent; silky-pubescent.

Erect; villous pubescent.

6. *C. fernandina*.

7. *C. parryi*.

1. *C. thurberi* (Gray) Wats. Somewhat glandular-puberulent, usually about 1 dm. high, branching from the base; leaves 2.5 cm. long, glabrous, slightly ciliate; bracts oblong, more or less united, 2-6 mm. long; involucres glabrous, chartaceous, triangular-prismatic, obscurely reticulated, 4-6 mm. long, 1-2 mm. broad, with 3 broad straight awned spurs at base and 3-5 broad short erect teeth; flowers 1 or 2 on slender pedicels, pubescent at base, nearly 2 mm. long; segments oblong-spatulate, obtuse or emarginate, the alternate ones slightly shorter.

Occasional on dry sandy plains, mostly farther inland than our range.

2. *C. leptoceras* (Gray) Wats. Very slender and nearly glabrous; leaves and bracts as in the last; involucre 4-6 mm. long, somewhat hirsute, deeply 4-6-cleft, the coriaceous turbinate base surrounded by as many rigid usually uncinat awn-like spurs; lobes rigid, narrow, unequal, attenuate into straight rigid somewhat divergent awns; flowers 2 or 3, occasionally exserted, villous-pubescent, 1 mm. long; segments narrowly oblong to ovate, nearly equal.

On dry sandy plains from San Gabriel eastward.

3. *C. californica* Gray. Hirsute and glandular, 3 dm. high or less, often reddish; bracts 1-2 cm. broad, lateral or rarely perfoliate, lobed; involucres on contracted branchlets and often clustered in the axils, 4-6 mm. long, obtusely angled, 2-3-toothed and 2-3-sided; segments of the perianth obovate, entire, villous-pubescent on the midvein.

Common on sandy soil along the coast and in the interior valleys.

4. *C. staticoides* Benth. Erect or decumbent, rather stout, 1-4 dm. high, with spreading branches, villous-pubescent, often purplish, leaves all basal, tomentose beneath, oblong, obtuse, 2.5-6 cm. long; bracts not acerose; involucres in rather close cymes, 3-6 mm. long, the alternate teeth larger, nearly equal; flowers nearly sessile, 4-5 mm. long, glabrous or sparsely villous on the midvein, cleft to near the middle; segments oblong, entire, the alternate ones about half as long and narrower; stamens inserted at base.

Very common and general. May-July.

5. *C. procumbens* Nutt. Slender, procumbent, branching from the base and diffuse, villous-pubescent, often yellowish; leaves

spatulate, 2.5 cm. long or less, not tomentose, bracts mostly small; involucre 2-3 mm. long, the alternate teeth strongly divergent, about equaling the tube, uncinat; flowers sessile, 2.5 mm. long, glabrous or somewhat villous, segments equal, narrowly oblong, obtuse, entire; stamens inserted at the base.

Frequent in the San Gabriel Mountains, *Davidson*.

6. *C. fernandina* Wats. Procumbent, rather stout, strongly silky-pubescent, 6-10 cm. long; leaves narrowly oblanceolate, not tomentose; lower bracts foliaceous, the upper narrowly linear; tube of involucre 2 mm. long, the teeth stout, with straight awns; flowers white, 2 mm. long; lobes nearly equal, broadly oblong, the alternate ones slightly narrower.

First collected in San Fernando Canyon. Otherwise only known from Chatsworth Park.

7. *C. parryi* Wats. Branching from the base, 5-8 cm. high, villous-pubescent; leaves narrowly oblanceolate, 2.5 cm. long, not tomentose; lower bracts as large, similar, pungent; tube of the involucre 2 mm. long, the alternate teeth strongly divergent, as long or longer; flowers nearly sessile, white or pinkish, 3 mm. long, villous on the nerves, cleft nearly to the middle; segments recurved, somewhat undulate, oblong-ovate, acutish, crenate, the inner ones about the same length, but narrower; stamens inserted at the base.

Scarcely reaching our eastern borders, but rather frequent on dry plains and foothills in San Bernardino and Riverside Counties.

5. ACANTHOCYPHUS Small.

Slender nearly glabrous acaulescent annual herbs, with erect wiry forking scapes. Leaves basal, firm, denticulate with spinulose teeth, dilated at the base. Bracts scale-like, ternate, united at the bases, inclined to one side of the axes. Involucres turbinate, truncate, on wire-like peduncles, with 18-20 hard ribs, which are prolonged into as many rigid acicular awns, these surpassing the tube in length. Flowers 5-14, of 2 kinds: staminate, included; pistillate, exserted. Pedicels subtended by linear or linear-spatulate bractlets. Perianth glabrous, segments 6. Stamens 9, inserted at the base of the perianth.

1. *A. parishii* (Parry) Small. Slender, 2-5 dm. high; stems with short-stalked glands at the base and for a short distance above the forks, otherwise glabrous and more or less glaucous; leaves 3-4 cm. long, finely spinulose-denticulate, tube of involucre 2 mm. long, much surpassed by its slender whitish bristles. (*Oxytheca parishii* Parry.)

Common in the pine belt of the San Gabriel and San Bernardino Mountains.

6. OXYTHECA Nutt.

Slender dichotomously branched annuals, stipitate-glandular at the nodes. Leaves in a rosette at base. Bracts foliaceous and more or less united, usually ternate. Involucres few-flowered, more or less distinctly pedicellate, campanulate or turbinate, 3-5-cleft, the teeth bearing an awn or awnless. Flowers equal, glandular-pubescent on the outside. Stamens 9.

1. *O. trilobata* Gray. Much branched from the base, 1 dm. high or less; leaves somewhat villous, oblanceolate, 2-3 cm. long; bracts ternate, oblong-lanceolate, awned, not reflexed; involucres broadly turbinate, 5-parted nearly to the base, strongly nerved, 3-4 mm. long, with awns slightly shorter than the lobes; pedicels spreading, 4-10 mm. long; flowers 3-5 in each involucre, light rose color, 2 mm. long; segments ligulate-oblong, 3-cleft, the lobes lanceolate, acuminate, slightly erose on the sides; ovary triangular.

Not common within our limits, but found on dry plains in San Bernardino, Riverside and San Diego Counties.

7. ERIOGONUM Michx.

Annual or perennial herbs or rarely shrubs, with basal, alternate or verticillate leaves, without stipules, and perfect involucre flowers. Involucre campanulate, turbinate or oblong, 4-8-toothed or 4-8-lobed, awnless, usually many-flowered; the more or less exserted pedicels intermixed with scarious narrow setaceous bracts or bractlets. Perianth 6-parted or deeply 6-cleft, petaloid. Stamens 9, inserted on the base of the perianth. Styles 3; stigmas capitate. Achene triangular, rarely lenticular.

Perianth not stipe-like at base.

Involucres nerveless, pedicellate; perianth-lobes unequal.

1. *E. thurberi*.

Involucres 5-6-nerved, mostly sessile; perianth-lobes similar.

Involucres capitate or fascicled; perennials.

Plants not caespitose.

Perennials with short woody caudex.

Bractlets densely villous-tomentose.

2. *E. latifolium*.

Bractlets glabrous.

3. *E. nudum*.

Shrubs.

Leaves rounded to oblong; maritime species.

Perianth villous.

4. *E. cinereum*.

Perianth glabrous.

Leaves narrowly oblong,
strongly revolute and fasci-
cled.

Plants caespitose.

Involucres solitary, often secund along
the virgate branches.

Perennials with short densely leafy
caudex.

Leaves rounded, usually brown
on the margins.

Leaves not rounded.

Involucres 2-3 mm. long.

Involucres 4-6 mm. long.

Annuals.

Stems and leaves white-woolly.

Involucres narrowly turbi-
nate, 2 mm. long.

Involucres cylindric, 4 mm.
long.

Stems glabrous or glabrate.

Involucres 5 mm. long.

Involucres 3 mm. long.

Perianth stipe-like at base, glabrous, bright
sulphur yellow or tinged with red.

5. *E. parvifolium*.

6. *E. fasciculatum*.

7. *E. kennedeyi*.

8. *E. saxatile*.

9. *E. wrightii*.

10. *E. elongatum*.

11. *E. gracile*.

12. *E. virgatum*.

13. *E. molestum*.

14. *E. davidsonii*.

15. *E. stellatum*.

1. *E. thurberi* Torr. Annual, very slender, about 15 cm. high, much branched below the middle, with ovate acute bracts at the forks, tomentose below the panicle; leaves subbasal, rounded-ovate, about 1 cm. long, undulate rugose, pubescent above, white tomentose beneath; pedicels slender, about 2 cm. long, erect or spreading, involucres campanulate, less than 2 mm. high, cleft nearly to the middle; flowers rose-colored or white, outer segments rounded, much broader than the inner lanceolate ones.

Common on dry plains and foothills from Pasadena eastward; also in the Santa Ana Mountains.

2. *E. latifolium* Smith. Caudex indurate, its branches few, short, very leafy; scapes not fistulose, 2-5 dm. high; leaves oblong to ovate, 2.5-5 cm. long, often undulate and becoming glabrate above; bracts triangular; heads large and dense, 12-20 mm. broad, solitary and terminal or few in a simple umbel; involucre tomentose, 4 mm. long; flowers glabrous, light rose color, 3 mm. long.

Bluffs near Santa Monica.

3. *E. nudum* Dougl. Caudex sparingly leafy; scapes rather slender, fistulose, 3-6 dm. high, sparingly branched above; leaves broadly ovate or oblong, obtuse, 1-5 cm. long, on slender petioles, undulate, densely tomentose beneath, becoming glabrate above; involucres usually 3-6 in each cluster, glabrous or nearly so, 4-6 mm. high; flowers glabrous or somewhat villous, 2-3 mm. long, white or rose color.

Occasional on Catalina Island and on the mainland east of our territory. August-September.

4. *E. cinereum* Benth. Shrubby, 8–15 dm. high, in dense clumps, hoary-tomentose throughout; leaves orbicular to oblong, 12–18 mm. long, on very short petioles, obtuse, undulate, strongly nerved; peduncles elongated, sparingly dichotomously branched, bearing few rather loose heads; bracts short; involucre 4 mm. long; perianth very villous, rose-colored, 2–3 mm. long.

Bluffs along the seashore at Santa Monica and San Pedro.

5. *E. parvifolium* Smith. Shrubby, about 3 m. high, more or less white-tomentose throughout; leaves broadly ovate to oblong, 8–18 mm. long, acute, abruptly narrowed at base to the very short petiole, revolute and undulate on the margins, becoming glabrate above; lower bracts conspicuous, the upper smaller; involucre tomentose, about 3 mm. long; perianth rose-colored, glabrous, about 3 mm. long.

Common on the sand-dunes along the seashore.

6. *E. fasciculatum* Benth. (WILD BUCKWHEAT.) Shrubby, 5 dm. high or more, more or less tomentose; leaves narrowly oblanceolate, revolute, tomentose beneath, glabrate above, 6–18 mm. long, much fascicled; peduncles short or elongated, bearing a short cymosely divided umbel; bracts rather conspicuous; involucre about 4 mm. high, glabrate; flowers rose-colored or whitish, glabrous.

The typical form is maritime, and more abundant about San Diego.

6a. *E. fasciculatum foliolosum* (Nutt.) Stokes. Leaves nearly glabrous on the upper surface; perianth villous without.

The common form on the mesas and foothills of the coastal slope.

6b. *E. fasciculatum polifolium* (Benth.) Torr. & Gray. Leaves hoary tomentose above; perianth densely villous; cymes mostly capitate.

The common form on the desert slopes, sometimes growing in the drier parts of the coastal region.

7. *E. kennedeyi* Porter. Woody caudex much branched, forming a dense mat; densely clothed with obovate to oblong revolute white-tomentose leaves, about 6–12 mm. long; peduncles wiry, 5–20 cm. long, more or less tomentose; involucre in a terminal capitate cluster, turbinate-campanulate, nerved and strongly angled, deeply triangular-toothed, 3–4 mm. long; perianth white or rose-colored, glabrous, 2–3 mm. long.

Coniferous forests of the southern Sierra Nevada to the San Bernardino Mountains; Mt. Waterman, *F. Grinnell*.

8. *E. saxatile* Wats. Caudex densely leafy, sparingly branched; leaves rounded or obovate, obtuse, 12–16 mm. broad, cuneate at base, densely tomentose on both sides; petioles short and thick; branches of the cymose panicle 1–4 dm. long, spreading; bracts subfoliaceous, triangular; involucre 3–4 mm. long, teeth acute; perianth rose color, 2–3 mm. long, the lobes appressed to the nearly glabrous achene, this abruptly narrowed at base. (*E. bloomeri* Parish.)

Frequent in the coniferous forests of the San Gabriel and San Bernardino Mountains.

9. *E. wrightii* Torr. Much branched, leafy at base, 2-5 dm. high, rather slender; leaves oblong-ovate, 15-25 mm. long, acute, narrowed at base to a 4-8 mm. long petiole; bracts all small, triangular; involucre loosely spicate along the ascending branches, 3 mm. high, the teeth rigid, acute; perianth rose color, 3 mm. long; achene scabrous on the angles above, these acute at base.

Frequent in the San Gabriel Mountains in the pine belt.

10. *E. elongatum* Benth. Stems erect, rather slender, from a sparingly branched base; leaves usually somewhat scattered, oblong-lanceolate, 2-3 cm. long, acute, narrowed to a short petiole, becoming glabrate above; bracts ovate-triangular to lanceolate, acute; involucre distant on the few elongated branches, 5-6 mm. high, obtusely toothed; flowers white or pale rose color, 2-3 mm. long; achene glabrous.

Common in the chaparral belt of all the mountains.

11. *E. gracile* Benth. Floccose-tomentose throughout, rather diffusely branched, 2-6 dm. high; leaves oblanceolate or broadly oblong, tomentose on both sides or less so above; bracts more or less elongated, the lower foliaceous; involucre rigid, acute, often dark brown; perianth white or pale rose color, 1.5 mm. long.

Common in sandy soil, especially toward the coast.

11a. *E. gracile leucocladon* (Benth.) Torr. Less branched, the branches strict, becoming glabrate; flowers pale rose color.

Dry sand-washes of the interior.

12. *E. virgatum* Benth. Slender, 3-6 dm. high, tomentose throughout, branches few, ascending, elongated, strictly virgate or flexuous; bracts lanceolate, shorter than the involucre, sometimes including 1 or more leaves; involucre tomentose, narrow, 4 mm. long; perianth 2 mm. long, white or yellowish, glabrous.

Common in the Mt. Pinos region, but not definitely known in the San Gabriel Mountains.

13. *E. molestum* Wats. Stems usually solitary, 3-7 dm. high, sparsely branching usually 1 dm. or more above the base, glabrous and glaucous; leaves all basal, rounded or cordate, 1-2 cm. wide, white-woolly on both surfaces, the margins undulate or crisped; bractlets apparently never foliaceous; involucre cylindric, about 5 mm. long, glabrous without, the teeth short; perianth white, tinged with rose.

A common species in the foothills of the San Bernardino Mountains.

14. *E. davidsoni* Greene. Closely related to the preceding species, from which it is best distinguished by its more slender habit and smaller involucre, 3 mm. long.

A common species in the San Gabriel Mountains, especially in the coniferous forests. First collected on Mt. Wilson by Dr. Davidson.

15. *E. stellatum* Benth. Perennial with a spreading woody base; leaves ovate to oblanceolate, white-tomentose beneath, glabrate above; peduncles 1-3 dm. high, loosely tomentose; in-

volucres in a simple or compound umbel; bracts resembling the leaves, the uppermost reduced; involucre with 8 reflexed lobes; perianth sulphur yellow or tinged with red; glabrous, tapering to a stipe-like base.

Common in the coniferous forests. A handsome species that should be introduced into gardens.

8. RUMEX L. Dock.

Perennial or annual leafy-stemmed herbs. Stem grooved, usually branched. Leaves entire or undulate, flat or crisped, with scarious obliquely truncate cylindric sheathing stipules. Flowers green, usually perfect, in a simple or compound often paniced raceme. Calyx 6-parted, the 3 outer sepals unchanged in fruit, the 3 inner ones (wings) usually bearing a grain-like callosity on the back, larger and enclosing the achene. Stamens 6; filaments short, glabrous; anthers oblong. Style 3-parted; stigmas peltate, tufted. Achenes 3-angled.

Flowers dioecious; leaves hastate.

1. *R. acetosella*.

Flowers perfect; leaves not hastate.

Inner calyx lobes with slender awned teeth.

Perennial; flowering branches divergent.

2. *R. pulcher*.

Annual, prostrate or erect, pubescent, branches not divergent.

3. *R. persicarioides*.

Inner calyx lobes entire or merely dentate.

Calyx lobes with callous grains, 3-4 mm. wide.

Stems decumbent; leaves plane.

4. *R. salicifolius*.

Stems erect; leaves more or less undulate.

Flower whorls remote, usually subtended by small leaves.

5. *R. conglomeratus*.

Flower whorls approximate, forming a rather dense compound raceme.

6. *R. crispus*.

Calyx lobes without grains, 8-12 mm. wide.

7. *R. hymenosepalus*.

1. *R. acetosella* L. Perennial by slender running rootstocks, slender, erect or nearly so, simple or branched, 2-4 dm. high, glabrous; leaves narrowly hastate, petioled, the uppermost leaves somewhat entire; panicle narrow, naked, becoming reddish; calyx green, 1 mm. long; stamens exerted; achene granular, exceeding the persistent calyx.

In moist grassy places about Los Angeles. Native of Europe.

2. *R. pulcher* L. Stems erect, 5-8 dm. high, with rigid divaricately spreading branches; leaves scabrous beneath, the basal oblong

or lanceolate, acute, cordate or obtuse at base; flowers on short stout rigid pedicels; wings ovate, 2-3 mm. long, with 4-6 rigidly awned teeth on each side.

Sparingly introduced, Inglewood. Native of Europe.

3. *R. persicarioides* L. Annual, pubescent, pale green; stem erect, simple or branched, 2-6 dm. high, sometimes spreading, very leafy; leaves lanceolate or oblong, 2 dm. long or usually less, narrowed at the base or cordate, acute at the apex, the margins undulate and somewhat crisped; panicle simple or branched; racemes erect, leafy bracted; whorls dense, usually rather distant; pedicels equaling or somewhat exceeding the inner calyx-lobes, jointed at the base; inner calyx-lobes oblong, 2 mm. long, with 1-3 bristles on each margin, each bearing an ovoid or oblong grain; achene about 1.5 mm. long, pointed, reddish.

Frequent in moist places, especially along the margins of ponds. Native of Europe.

4. *R. salicifolius* Weinm. Glabrous and somewhat glaucous; stems ascending or spreading, simple or branched, grooved, flexuous, 4-8 dm. long; leaves mostly lanceolate, acute or acuminate, petioled, not undulate or crisped; racemes dense, interrupted below in fruit; flowers in dense clusters; wings 2 mm. long, undulate or subdentate, each bearing a large ovoid grain; achene 2 mm. long, dark red.

Frequent in moist places along the coast and in the mountains.

5. *R. conglomeratus* Murr. Stems slender, erect, commonly branched, 3-9 dm. high; leaves oblong to lanceolate, 15 cm. long or less, somewhat undulate and crisped, the lower long petioled, cordate at base, acute or obtuse at apex, the upper short petioled; panicle very loose, much branched; racemes slender, interrupted; flowers loosely whorled, the whorls distant; pedicels slender, shorter than or equaling the wings; wings ovate, fiddle-shaped, 3 mm. long, toothed near the base, each bearing a large oblong grain; achene about 1.5 mm. long, pointed, red.

Common in damp land, especially toward the coast.

6. *R. crispus* L. Stems simple or branched above, erect, rather slender, 3-10 dm. high; leaves crisped and undulate, the lower oblong or oblong-lanceolate, 15-30 cm. long, long petioled, the upper narrowly oblong or lanceolate, short petioled, all cordate or obtuse at base; panicle rather open; racemes simple or compound; flowers rather loosely whorled; calyx green; fruiting pedicels about twice the length of the wings, jointed near the base; wings cordate, 3-4 mm. long, truncate or notched at base, erose-dentate or nearly entire, each bearing a grain; achene 2 mm. long, dark brown.

Common in moist places.

7. *R. hymenosepalus* Torr. Stems erect, 4-6 dm. high, stout, leafy, simple or branched above; leaves attenuate to a short thick fleshy petiole, oblong to broadly lanceolate, often 3 dm. long, acute, strongly undulate; racemes paniced, about 3 dm. long; pedicels 6-12 mm. long; wings 8-12 mm. broad, rose color, deeply cordate, strongly reticulate-veined, grains entirely wanting; achene 4 mm. long.

Frequent in dry sandy soil. Canaigre of commerce.

9. **POLYGONUM** L. KNOTWEED.

Annual or perennial, terrestrial or aquatic herbs, with alternate entire leaves and naked, ciliate or foliaceous margined sheaths. Flowers usually perfect, often colored, variously clustered. Pedicels jointed. Calyx 4-5-parted, usually petaloid, the outer segments slightly larger than the inner ones. Stamens 5-9; filaments glabrous; anthers oblong. Style 2-3-parted or 2-3-cleft; stigmas capitate. Achene lenticular or 3-angled, invested by the persistent calyx.

Flowers spicate.

Spikes drooping; stamens 6; achenes lenticular.

1. *P. lapathifolium*.

Spikes erect; stamens 8; achenes 3-angled.

2. *P. hydropiperoides*.

Flowers not in spikes.

Leaves narrowly lanceolate.

3. *P. aviculare*.

Leaves cordate.

4. *P. convolvulus*.

1. ***P. lapathifolium* L.** Stem simple or much branched, erect or ascending, swollen at the nodes, 3-12 dm. high, the peduncles and petioles glandular; leaves lanceolate or oblong-lanceolate, 5-20 cm. long, attenuate to the apex, tapering to the short petiole, ciliate, inconspicuously punctate; sheath cylindric, ribbed or striate; racemes paniced, 2.5-10 cm. long, drooping, narrow, rather dense, calyx pink, white or greenish, 5-parted; stamens 6; style 2-parted to below the middle; achene lenticular, 2 mm. long. (*P. nodosum* Pers.)

Occasional along streams.

2. ***P. hydropiperoides* Michx.** Stems rather stout, 3-10 dm. high, erect or decumbent, clothed with short appressed hairs; leaves lanceolate, obtuse; sheath cylindric, loose, ciliate; racemes paniced, terminal, erect, narrow, more or less interrupted, 3-7 cm. long; calyx white or whitish, often conspicuous; stamens 8; style 3-parted to below the middle; achene 3-angled, ovoid or oblong, 2-2.5 mm. long, smooth.

Frequent along streams, especially toward the coast.

3. ***P. aviculare* L.** Annual or perennial, slender, glabrous, bluish-green; stem prostrate or ascending, simple or much branched, 1-6 dm. long; leaves linear to oblanceolate, commonly oblong, 6-18 mm. long, nearly sessile; sheath oblique, 2-parted or becoming lacerate; flower clusters axillary, 1-5-flowered; flowers small, short pedicelled; calyx green, its 5 lobes with white or pinkish margins; stamens 5-8; style short, 3-parted to near the base; achene 3-angled, ovoid, 2 mm. long, reticulated.

A common weed in waste places.

4. ***P. convolvulus* L.** Annual, glabrous, scurfy; stem twining or trailing, branched, 1-10 dm. long; leaves ovate-sagittate, long-

petioled, acuminate, slightly ciliate, 1-7 cm. long; sheath oblique, rough on the margin; axillary clusters loosely flowered; flowers greenish, pendulous on slender pedicels; calyx 5-parted, closely investing the achene; stamens 8; style short, nearly entire; stigmas 3; achene 3-angled, granular.

Cultivated fields about Pasadena, *McClatchie*.

Family 25. CHENOPODIACEAE.

GOOSEFOOT FAMILY.

Herbs or shrubs, often succulent, mealy or scurfy, sometimes fleshy. Leaves alternate or rarely opposite, sometimes wanting, without stipules. Flowers perfect or unisexual, with an herbaceous calyx of 2-5 often keeled rigid sepals, or sometimes wanting in pistillate flowers. Stamens distinct, as many as the sepals and opposite them or fewer; anthers 2-celled. Ovary superior, 1-celled, 1-ovuled, becoming an achene or utricle in fruit. Embryo annular and surrounding the endosperm or spiral and with the endosperm lateral or wanting.

Leaves present.

Leaves opposite, linear.

1. NITROPHILA.

Leaves alternate.

Flowers perfect or polygamous, all similar.

Calyx 3-5-cleft or 3-5-parted.

Leaves not semiterete or spiny.

Leaves simple: calyx deeply cleft or parted.

Stamens 1.

2. APHANISMA.

Stamens mostly 5.

3. CHENOPODIUM.

Leaves pinnatifid.

4. ROUBIEVA.

Leaves semiterete or spiny.

Leaves semiterete, fleshy.

8. DONDIA.

Leaves linear, pungent-tipped.

9. SALSOLA.

Calyx of 1 sepal; stamen 1.

5. MONOLEPIS.

Flowers monoecious or dioecious: the staminate with a calyx, the pistillate with 2 sepal-like bracts.

6. ATRIPLEX.

Leaves reduced to opposite scales; stems fleshy, jointed.

7. SALICORNIA.

1. NITROPHILA Wats.

A low decumbent perennial herb, with fleshy opposite amplexicaul leaves and axillary perfect flowers. Sepals

5, rarely 6 or 7, chartaceous, concave and carinate. Stamens 5, united at base into a narrow disk. Style slender; stigmas 2. Achene beaked by the persistent style.

1. *N. occidentalis* (Moq.) Wats. Stems decumbent, oppositely branched, 1-4 dm. long, arising from a deep taproot; leaves linear, sessile 1-2.5 cm. long, the floral shorter, glabrous pungent at apex; flowers solitary in the axils subtended by 2 bracts, or often 2 or 3, the central bractless and the lateral pedicelled; sepals pinkish or whitish, about 2.5 mm. long.

In low alkaline soils. Santa Monica; Studebaker, *Braunton*: San Bernardino Valley, *Parish*.

2. *APHANISMA* Nutt.

Slender glabrous annuals, with alternate sessile entire leaves, and axillary mostly solitary perfect bractless flowers. Calyx 3-cleft, with concave segments unchanged in fruit. Stamen 1; filament short. Ovary depressed; style shortly 2-3-cleft; pericarp somewhat 5-angled, rather thick and indurate. Seed horizontal, with very thin crustaceous testa. Embryo annular, surrounding the copious endosperm.

1. *A. blitoides* Nutt. Stems ascending, branched, 3-7.5 dm. high; leaves thin, oblanceolate to ovate-oblong, the upper ones ovate, acute, 6-15 mm. long; calyx minute, its lobes ovate, obtuse, closely appressed to the base of the fruit; fruit 1 mm. broad; seed shining, punctulate-rugose.

San Pedro, *Davidson*; Catalina Island.

3. *CHENOPODIUM* L. GOOSEFOOT.

Annual or rarely perennial herbs, mostly introduced weeds. Leaves often white-mealy, sometimes glandular, alternate, petioled. Flowers perfect, bractless, clustered in axillary or terminal often paniced spikes. Calyx herbaceous, 3-4-parted or mostly 5-parted; the lobes usually connate or crested, more or less closely covering the fruit. Pericarp membranous, closely investing the lenticular or subglobose, horizontal or vertical seed. Embryo annular or curved around the copious endosperm.

Calyx dry in fruit.

Annuals; introduced weeds.

Leaves mealy or glabrous.

Leaves white-mealy; spikes dense, usually longer than the leaves.

1. *C. leptophyllum*.

Leaves bright green, very sparsely mealy; spikes loose, shorter than the leaves.

2. *C. murale*.

Leaves glandular-pubescent and heavy scented.

3. *C. ambrosioides*.

Perennial; flowers in elongated interrupted spikes.

4. *C. californicum*.

Calyx red and fleshy in fruit.

5. *C. rubrum*.

1. *C. leptophyllum* Nutt. Stems erect, 0.5–2 m. high, branches ascending; leaves rhombic-ovate or the upper lanceolate, narrowed at the base, acute or sometimes obtuse at the apex, white-mealy beneath, dentate or sinuate or the upper entire, 2–6 cm. long; spikes densely flowered, often paniced; calyx about 1 mm. broad in fruit, its lobes strongly carinate.

A common weed in waste fields. May–September.

2. *C. murale* L. Stout, erect, 3–6 dm. high, the lower branches usually spreading or decumbent; leaves 3–8 cm. long, rhombic-ovate, broadly cuneate or subtruncate at the base, acute at the apex, glabrous or slightly mealy when young; spikes paniced, loosely flowered; calyx enclosing the fruit; seed acutely margined.

Frequent in waste places. Often flowering the year round. Native of the Old World.

3. *C. ambrosioides* L. Stem ascending or erect, 0.5–1 m. high, much branched and leafy, more or less glandular-pubescent, strong-scented; leaves oblong to lanceolate, obtuse, subacute or acute at the apex, narrowed to a short petiole, repand-dentate, undulate or the upper entire, 3–9 cm. long; flower clusters dense, axillary upon the branches, forming a leafy spike; calyx-lobes appressed; pericarp deciduous.

Frequent in waste places. Native of Europe.

4. *C. californicum* Wats. Stout, erect or decumbent at base, 5–8 dm. high, from a thick fusiform root; leaves broadly triangular-hastate, truncate or cordate at base, 3–9 cm. long, sharply and unequally sinuate-dentate, dark green, glabrous or slightly mealy when young; flowers in dense clusters in terminal spikes; calyx deeply 5-toothed, loosely enveloping the fruit; pericarp persistent; seed subglobose, about 2 mm. broad.

Frequent in the valleys and foothills. March–May.

5. *C. rubrum* L. Annual, somewhat fleshy and glabrous or commonly somewhat mealy; stem erect, leafy, 3–7 dm. high, with strict or ascending branches; leaves thick, 3–5 cm. long, rhombic-ovate or rhombic-lanceolate, coarsely sinuate-dentate, or the upper entire, acute or obtuse at apex, narrowed at base to a rather short petiole; flowers in compound, leafy-bracted axillary and terminal spikes, often exceeding the leaves; calyx 3–5-parted, its segments slightly fleshy, reddish, not keeled, obtuse, about as long as the utricle; stamens 1–2; stigmas short; utricle horizontal, shining, rather sharp-edged.

Occasional in saline flats and marshes along the coast. August–November.

4. ROUBIEVA Moq.

A perennial herb, glandular-pubescent, strong scented, prostrate and diffusely branched, with narrow small short-petioled deeply pinnatifid leaves. Flowers small, green, perfect or pistillate, solitary or in small axillary clusters. Calyx urn-shaped, 3-5-toothed, in fruit becoming ovoid, strongly reticulated. Stamens 5. Styles 3, exserted. Wall of the pericarp thin, glandular. Embryo a complete ring.

1. *R. multifida* (L.) Moq. Prostrate or ascending, very leafy, 1-4 dm. long; leaves lanceolate to linear or linear-oblong, deeply pinnatifid into linear-oblong, acute, entire or toothed lobes; flowers 1-6 in an axil, sessile, scarcely 1 mm. broad, some perfect, some pistillate; fruiting calyx 3-nerved and strongly reticulate-veined; utricle compressed.

Occasionally found in waste places. Pasadena; Compton.

5. MONOLEPIS Schrad.

Low branching annual herbs, with small narrow alternate entire, toothed or lobed leaves and polygamous or perfect flowers in small axillary clusters. Calyx of a single persistent herbaceous sepal. Stamen 1. Styles 2, slender. Utricle flat, the pericarp adherent to the vertical seed. Embryo nearly a complete ring.

1. *M. nuttalliana* (R. & S.) Greene. Slightly mealy when young, becoming glabrous or nearly so; stem 8-24 cm. high, with many ascending branches; leaves lanceolate, short-petioled or the upper sessile, 1-6 cm. long, narrowed at base, 3-lobed, the middle lobe linear or linear-oblong, acute or acuminate, 2-4 times as long as the ascending lateral ones; sepal oblanceolate or spatulate; utricle minutely pitted, 1 mm. broad.

Cienega, *Davidson*.

6. ATRIPLEX L.

Annual or perennial herbs or shrubby, often scurfy-canescient or silvery, with alternate petioled or sessile leaves, or some of them opposite. Flowers dioecious or monoecious, small, green, in paniced spikes or in axillary clusters. Staminate flowers bractless, consisting of a 3-5-parted calyx and an equal number of stamens. Pistillate flowers subtended by 2 or more united bractlets which enlarge in fruit, their margins entire or toothed, often crested or winged. Calyx none. Stigmas 2. Utricle completely or partially enclosed by the fruiting bractlets. Embryo annular.

Annuals, monoecious.

Herbage white-mealy, succulent; bracts distinct or nearly so.

1. *A. patula*.

Herbage whitish-scurfy, not succulent; bracts more or less united.

Staminate and pistillate flowers intermingled in axillary clusters.

2. *A. microcarpa*.

Staminate flowers in naked terminal spikes, the pistillate in axillary clusters.

Plants erect or bushy, mostly 6–10 dm. high.

Fruiting bracts 2 mm. long.

3. *A. coulteri*.

Fruiting bracts 5–6 mm. broad.

4. *A. expansa*.

Plants decumbent; bracts 4 mm. broad.

5. *A. watsoni*.

Perennials.

Monoecious herbaceous perennials.

Fruiting bracts not red and fleshy.

Fruiting bracts 2 mm. long in fruit, laciniately toothed; diffuse plants.

6. *A. serenana*.

Fruiting bracts entire, 3–4 mm. long; prostrate plants.

Leaves thin, white-mealy; bracts not united.

7. *A. californica*.

Leaves thick, densely white-scurfy; bracts united.

8. *A. leucophylla*.

Fruiting bracts fleshy and red; plants prostrate.

9. *A. semibaccata*.

Dioecious shrubs.

Fruiting bracts without lateral wings.

10. *A. breweri*.

Fruiting bracts with 4 conspicuous lateral wings.

11. *A. canescens*.

1. *A. patula* L. Stems stout and succulent, erect, 2–6 dm. high, with few ascending branches, herbage green, only the growing parts somewhat mealy; leaves lanceolate or linear, entire or coarsely toothed, sometimes hastate at base; inflorescence more or less leafy below, the clusters dense in spikes or panicles; bracts rhombic-ovate, thick and subcoriaceous, 8–12 mm. long, entire or toothed, sometimes muricate.

Frequent in saline places, especially toward the coast.

2. *A. microcarpa* Dietrich. Minutely and somewhat hoary puberulent, the numerous reddish branches nearly glabrous; stems 15–30 cm. long, spreading and decumbent; leaves oblong or oblong-ovate, 6–10 mm. long, acute at each end, sessile; flowers in small axillary clusters, the terminal ones usually more staminate; fruiting bracts round-obovate, usually less than 2 mm. broad, the roundish summit narrowly bordered with 3–7 small herbaceous teeth, sides frequently somewhat muricate or 1-nerved; seed 0.5 mm. broad.

Rather common in saline places toward the coast.

3. *A. coulteri* Dietr. Erect or diffusely branching annual, 3-10 dm. high, woody at base, the branches very slender; leaves oblanceolate or lanceolate, 12-25 mm. long, entire, sessile or the lower petioled; fruiting bracts rounded, 2 mm. broad, with a narrow herbaceous laciniately toothed border reaching nearly to the base, reticulate-veiny on the sides and smooth or rarely muricate.

Common about San Diego and extending north to Capistrano and Santa Catalina.

4. *A. expansa* Wats. Annual, erect, much branched, 5-10 dm. high, closely and finely mealy-scurfy; leaves 2.5-7 cm. long, broadly ovate or deltoid-ovate, irregularly and sharply sinuate-toothed, the lower on stout petioles about 1 cm. long, and strongly 3-nerved from the base, the upper reduced to sessile more or less cordate floral bracts, as broad or broader than long; flower clusters more or less unisexual, those of the lower clusters mostly staminate; fruiting bracts sessile, clustered in the axils of the leaves, orbicular, mostly 3-nerved, 4 mm. long, 5-6 mm. broad, usually emarginate at the apex, the wing sharply toothed and commonly bearing on one face a few irregular projections or crests.

Occasional in the Ballona Marshes.

5. *A. watsoni* A. Nelson. Branching from the base, somewhat woody below, slender, decumbent or sometimes prostrate, densely hoary-scurfy; leaves mostly opposite, cuneate-rounded at base, acute or acutish, oblong-ovate, 12-25 mm. long; staminate flowers in dense clusters in short interrupted terminal spikes; calyx 5-cleft; fruiting bracts sessile, slightly cordate at base, acute, 4 mm. long and broad, compressed, united to above the middle, entire or slightly denticulate; seed nearly 2 mm. long. (*A. decumbens* Wats.)

Not known to occur within our limits, but found at San Diego.

6. *A. serenana* A. Nelson. Stems rather stout and more or less diffuse, 3 dm. or more long; branches smooth and shining, straw-colored; foliage finely grayish-scurfy; leaves oblong-ovate, acute, 8-18 mm. long, thin, sharply toothed or the smaller entire; flower-clusters unisexual, the staminate in terminal simple or compound spikes, the pistillate axillary; fruiting bracts 2 mm. long, the margins laciniately toothed or dentate, the central tooth lanceolate and conspicuous. (*A. bracteosa* Wats.)

Very common throughout our range in saline places.

7. *A. californica* Moq. Finely white-mealy; stems slender, leafy, mostly herbaceous, prostrate or scrambling among low shrubs, usually much branched and forming a mat; leaves ovate-lanceolate to oblong-lanceolate, 4-12 mm. long, sessile or narrowed to a short petiole; staminate flowers in terminal spikes, the pistillate in axillary clusters; fruiting bracts membranous, ovate, acute, entire, loosely closed over the utricle but not united, 3 mm. long or less.

Occasional in saline places along the coast and on sandy bluffs overhanging the sea.

8. *A. leucophylla* Dietrich. Densely whitish-scurfy, stems stout, 3 dm. long or more, mostly prostrate; leaves thickish, orbicular or elliptic, 8-16 mm. long, sessile, 3-nerved; staminate clusters in a

dense terminal spike, 1–2 cm. long; pistillate flowers in axillary 2–3-flowered clusters; fruiting bracts completely united and with a short terminal wing, globose or nearly so, 3–4 mm. long.

Rather common on the seabeach sands, often more or less buried.

9. *A. semibaccata* R. Br. Perennial; stems much branched from the base, prostrate, woody below, branches 3–10 dm. long, branchlets slender, whitish, leafy throughout; leaves oblong-lanceolate, tapering at base to a short petiole rounded at apex, 2–4 cm. long, 15–30 mm. wide, entire or commonly irregularly and remotely dentate, pale green above, silvery beneath; staminate flowers in short capitate spikes terminating the branchlets; fruiting bracts about 3 mm. long, the margins entire or minutely toothed on the lateral angles, becoming fleshy and reddish when mature.

Becoming well established along roadsides and in waste places. Wiseburn; Wilmington; Santa Ana. More common about San Diego and Escondido. Native of Australia and cultivated to some extent under the name of Australian salt-bush.

10. *A. breweri* Wats. Dioecious, stout, 1.5–2 m. high, woody below, grayish-puberulent; the branches terete, somewhat flexuous; leaves ovate-oblong, somewhat rhombic-cuneate at the base, obtuse or abruptly acute, 2.5–5 cm. long; calyx deeply 4-cleft; fruiting bracts spongy, ovate to rounded, convex, united at the margin to the middle, entire, 2–3 mm. broad. (*A. orbicularis* Wats.)

Bluffs along the seashore. Capistrano, Playa del Rey, Santa Monica and northward.

11. *A. canescens* (Pursh) James. Erect and shrubby, rather strict, about 8 dm. high; leaves oblanceolate to narrowly oblong or linear, 15–45 mm. long, obtuse or acutish, narrowed to the base, entire; usually dioecious; the flowers in paniced spikes; calyx 5-cleft; fruiting bracts connate and indurated, not scurfy or muricate, the wings distinct and broad, veined and entire or toothed, 4–6 mm. long.

Occasional in the vicinity of San Bernardino and San Diego. A common species on the desert.

7. SALICORNIA L.

Fleshy glabrous annual or perennial herbs, with opposite terete branches, the leaves reduced to mere opposite scales at the nodes. The flowers sunken, 3–7 together in the axils of the upper leaves, forming narrow terminal spikes, perfect or the lateral staminate. Calyx fleshy, 3–4-toothed or truncate, becoming spongy in fruit, deciduous. Stamens 2 or sometimes solitary, exserted. Styles and stigmas 2. Utricles enclosed by the spongy fruiting calyx; embryo conduplicate.

1. *S. ambigua* Michx. Perennial by a woody rootstock; stem decumbent or trailing, 1–6 dm. long, the branches ascending or

erect, nearly or quite simple, rather long-jointed, 7–15 cm. long, pale green; scales broadly ovate, acute or obtuse; fruiting spikes 1.5–4 cm. long, broad as the branches; flowers about all equally high and about equaling the joints.

Very common in salt marshes along the coast. May–August.

2. *S. subterminalis* Parish. Perennial from a tufted ligneous spreading-prostrate caudex; the herbaceous stems widely spreading or suberect, crowded or fascicled, 1–3 dm. high, internodes short; the numerous branchlets slender, both members of each pair often ascending on the same side of the main stem, giving it a unilateral appearance; spikes 1–3 cm. long, of few–several enlarged fertile bracts (joints broader than long) and usually about as many slender longer sterile ones; scales acute, becoming divaricate-alate; middle flower united nearly or quite to the stigmas; fruit glabrous.

Not common within our limits. Capistrano; Mesmer. Easily distinguished from *S. ambigua* by its much greener slender and numerous branchlets. Common about San Diego.

8. *DONDIA* Adans.

Fleshy annual or perennial herbs, sometimes suffrutescent, with alternate narrowly linear thick or nearly terete entire leaves and perfect or polygamous bracteolate flowers solitary or clustered in the upper axils. Calyx 5-parted or 5-cleft, the segments sometimes keeled or slightly winged in fruit, enclosing the utricle. Stamens 5. Styles usually 2, short. Seed vertical or horizontal; embryo coiled into a flat spiral.

Suffrutescent perennials.

Herbage glabrous; perianth cleft to the base. 1. *D. moquini*.

Herbage more or less pubescent; perianth cleft to the middle.

Seeds less than 1 mm. broad.

Seeds nearly 2 mm. broad.

Annual.

2. *D. multiflora*.

3. *D. californica*.

4. *D. diffusa*.

1. *D. moquini* (Torr.) Nelson. Erect branched, rather bushy, usually about 6 dm. high, somewhat woody at base, branches leafy, smooth or somewhat tomentose; leaves linear, subterete, narrow at base, 12–18 mm. long, acute, the floral similar; clusters mostly 7-flowered; perianth deeply cleft, incurved or slightly cucullate; seed vertical, 1.5 mm. broad, dark brown, finely tuberculate. (*Suaeda torreyana* Wats.)

Common in saline places. July–September.

2. *D. multiflora* (Torr.) Heller. Somewhat shrubby, 6–10 dm. high, with slender diffuse or divaricate leafy branches, more or less tomentose; leaves numerous, small, 1 cm. long or less, oblong, narrow at base, obtuse or acute; flowers solitary or clustered, shortly lobed, small; seed mostly vertical, less than 1 mm. broad, obscurely tuberculate. (*Suaeda suffrutescens* Wats.)

In saline places in the interior and occasional along the coast.

3. *D. californica* (Wats.) Heller. Glabrous or pubescent; stems woody at base, about 2 dm. high; branches decumbent, 6–12 dm. long, woody below, bearing ascending or erect, very leafy branchlets 15–30 cm. long; leaves broadly linear, acute, 10–14 mm. long; flowers 4 mm. broad, 1–3 in the axils; perianth deeply cleft; seed vertical, nearly 2 mm. broad, faintly reticulated. (*S. californica* Wats.)

Frequent in saline places along the coast.

4. *D. depressa* (Pursh) Britton. Annual, branched from the base and usually above, 2–5 dm. high; branches decumbent or ascending, usually very leafy; leaves narrowly linear, 2–3 cm. long, broadest at or near the base, the upper often narrowly lanceolate; sepals acute, 1 or more of them strongly keeled in fruit; seed about 1 mm. broad, dull, minutely reticulated.

Frequent in low alkaline places toward the coast. Hyde Park; Mesmer.

9. SALSOLA L.

Annual or perennial much-branched herbs, with prickly-pointed leaves and sessile perfect 2-bracteolate flowers, solitary in the axils or sometimes several together. Calyx 5-parted, its segments appendaged by a broad membranous horizontal wing in fruit and enclosing the utricle. Stamens 5. Ovary depressed; styles 2. Utricle flattened, its seed horizontal; embryo coiled into a conic spiral.

1. *S. tragus* L. Annual, more or less scabrous-pubescent, bushy-branched, the branches slender, 2–6 dm. high; leaves and outer bracts usually red at maturity, the former not noticeably swollen at base, linear, somewhat fleshy; calyx membranous, conspicuously veiny, its wings longer than the ascending lobe.

Occasional along roadsides. Commonly called Russian thistle.

Family 26. AMARANTHACEAE.

AMARANTH FAMILY.

Ours herbs with alternate or opposite, simple mostly entire leaves. Flowers small, usually green, perfect or unisexual, bracteolate, variously clustered, usually in terminal spikes or axillary heads. Calyx herbaceous or membranous, 2–5-parted, the segments distinct or more or less united. Corolla none. Stamens 1–5, mostly opposite the calyx-lobes, hypogynous; anthers 1–2-celled. Ovary superior, 1-celled, with 2–3 stigmas.

Fruit a utricle, circumscissile or bursting irregularly. Embryo annular; endosperm mealy, usually copious.

Leaves alternate; flowers unisexual.

1. AMARANTHUS.

Leaves opposite; flowers perfect.

2. ALTERNANTHERA.

1. AMARANTHUS L. AMARANTH.

Ours annual weeds, with alternate petioled undulate or crisped leaves, and polygamous or monoecious small green or purplish flowers, in dense spikes or axillary clusters. Calyx of 2-5 distinct sepals. Anthers 2-celled, longitudinally dehiscent. Fruit indehiscent or circumscissile, beaked by the persistent style.

Utricle circumscissile, the top lifting off like a lid.

Stamens 5; herbage roughish pubescent.

1. *A. retroflexus*.

Stamens 3; herbage glabrous.

Stems erect, bushy-branched; sepals 3.

2. *A. graecizans*.

Stems prostrate; sepals 4-5.

3. *A. blitoides*.

Utricle fleshy, indehiscent.

4. *A. deflexus*.

1. *A. retroflexus* L. Stems stout, erect, with a few erect or ascending branches from the base, 3-10 dm. high; herbage rather deep green often somewhat reddish, roughish-puberulent; leaves rhombic-ovate, ovate or the upper lanceolate, on slender petioles, 2-6 cm. long or sometimes longer; flowers green, densely clustered in terminal and axillary spikes, which are sessile, stout, ovoid-cylindric, erect or ascending, 2-4 cm. long, 8-14 mm. broad; bracts lanceolate-subulate, scarious except the carinate midrib, 3-6 mm. long; sepals 5, scarious, oblong-lanceolate, cuspidate, 2 mm. long or less; stamens 5; utricle black and shining, circumscissile, about 1 mm. broad.

Frequent in uncultivated orchards and gardens. Native of Europe.

2. *A. graecizans* L. Stems erect, bushy-branched, glabrous, whitish, 2-6 dm. high; leaves oblong, spatulate or obovate, 2-4 cm. long, slender petioled; flowers polygamous, in small axillary clusters; bracts subulate, pungent-pointed, much longer than the 3 membranous sepals; stamens 3; utricle slightly rugose, longer than the sepals; seeds about 0.7 mm. broad. (*A. albus* L.)

Rather common summer weed in cultivated fields. Native of Europe.

3. *A. blitoides* Wats. Stems somewhat succulent, prostrate, 3-6 dm. long, whitish; leaves glabrous, deep green, shining; flowers in small axillary few-flowered spikelets; bracts ovate-oblong, shortly acuminate, 2-3 mm. long; sepals 4-5, 1.5-2 mm. long, oblong, obtuse and mucronulate or acute; stamens 3; utricle smooth, circumscissile; seed 1.5 mm. broad.

Moist soil at Santa Monica, *Davidson*. Common about Rialto.

4. *A. deflexus* L. Glabrous, purplish-green, somewhat succulent; stem usually much branched, erect, stout or slender, 3–9 dm. high; leaves ovate to oval, obtuse to emarginate at apex, mostly narrowed at the base, 3–7 cm. long, 1–4 cm. wide; petioles slender, often as long as the blades or the lower longer; flowers polygamous, in dense mostly short and thick terminal spikes and capitate in the axils; bracts shorter than the 2–3 oblong or spatulate sepals; utricle fleshy, 3–5-nerved, smooth, indehiscent, rather shorter than the sepals.

Redondo, *Greata*. A ballast plant introduced from tropical America.

2. *ALTERNANTHERA* Forsk.

Annual or perennial branching herbs, with opposite (at least the lower) entire leaves and perfect or dioecious flowers, in panicles or heads, 3-bracted. Sepals 5. Stamens 5, united into a short cup at base; sterile filaments minute, tooth-like; anthers 1-celled. Style short; stigma capitate or 2-lobed. Seed vertical, lenticular.

1. *A. achyrantha* R. Br. Stem prostrate, pubescent; 1–3 dm. long; leaves smoothish, oval or obovate, narrowed into a petiole; heads mostly axillary, solitary or clustered, dense, oval, white; sepals lanceolate, spine-pointed, woolly with barbed hairs on the back, the 2 inner ones much smaller; sterile filaments subulate, equaling the fertile ones.

Streets of Los Angeles, *Davidson*. Native of tropical America.

Family 27. BATIDACEAE. BATIS FAMILY.

A low maritime shrub, with opposite entire exstipulate leaves and dioecious bracteate flowers, in axillary sessile ament-like spikes. Staminate flowers distinct. Calyx campanulate, 2-lipped. Petals 4, rhombic-ovate, clawed. Pistillate flowers 8–12, united into a fleshy spike, without perianth. Ovaries coherent, 4-celled, becoming a fleshy, ovoid-conical fruit; stigma sessile, capitate. Seeds 1 in each cell, erect, oblong; testa membranous; embryo slightly curved, caulicle inferior; endosperm none. Represented by a single monotypic genus.

1. *BATIS* L.

Characters of the family.

1. *B. maritima* L. Glabrous, stems branched, prostrate, 9–14 dm. long, the short flowering branches erect; leaves linear to ovate-

oblong, 2.5 cm. long, narrowed to the base; spikes solitary in the axils along the branches; the staminate 4–8 mm. long; the pistillate 2 mm. long, becoming 10–15 mm. long in fruit; bracts entire, obtuse or acute, in vertical rows, persistent, those of the pistillate deciduous; petals white; stamens 2 mm. long, exserted.

San Pedro and Redondo to San Diego.

Family 28. PHYTOLACCACEAE.

POKEWEED FAMILY.

Ours perennial herbs with alternate entire leaves and perfect racemose flowers. Sepals 4–5, imbricated in the bud. Petals wanting. Stamens usually 10, hypogynous, with subulate or filiform filaments; anthers 2-celled, longitudinally dehiscent. Ovary superior, 10-celled; ovules solitary, amphitropous; styles 10; stigmas linear or filiform. Fruit a berry. Seeds compressed; embryo annular; endosperm mealy.

1. PHYTOLACCA L.

With the characters of the family.

1. *P. decandra* L. Stems branching from a perennial root, 1.5–3 dm. high, glabrous, strong smelling and succulent; leaves oblong-lanceolate or ovate-lanceolate, acute or acuminate at both ends, 1–3 dm. long; petioles 2–8 cm. long; racemes formed at the base of the branches, becoming opposite the leaf, peduncled, 5–20 cm. long; pedicels divergent, with a subulate-lanceolate bract at base and usually with 2 similar ones above; calyx white, 4–6 mm. long; sepals orbicular; ovary subglobose; style recurved; berry dark purple, 10–12 mm. in diameter.

Santa Monica, according to *Davidson*.

Family 29. NYCTAGINACEAE.

FOUR-O'CLOCK FAMILY.

Ours herbs with fragile stems and tumid joints, and entire petiolate exstipulate mostly opposite leaves. Flowers perfect, with a calyx-like involucre. Petals wanting. Calyx corolla-like, campanulate or salver-shaped, 4–5-lobed or 4–5-toothed. Stamens hypogynous; filaments filiform; anthers 2-celled, dehiscent by

lateral slits. Ovary superior, enclosed by the tube of the persistent calyx, 1-celled, 1-ovuled; style short or elongated; stigma capitate. Fruit consisting of the hardened base of the calyx, often costate or winged, enclosing the free achene.

Calyx funnellform or campanulate; fruit slightly ribbed.

Calyx salver-shaped; fruit winged.

1. MIRABILIS.

2. ABRONIA.

1. MIRABILIS L. FOUR-O'CLOCK.

Perennial herbs, somewhat woody toward the base, with opposite leaves and axillary solitary or paniculate peduncles. Involucre calyx-like, 5-cleft or 5-parted, herbaceous unchanged in fruit, bearing 1-12 flowers. Calyx tubular or narrowly campanulate, with somewhat spreading lobes. Stamens 5, equaling the calyx; filaments united at the base. Fruit globose to ovate-oblong, smooth or slightly ribbed or angled.

1. *M. froebellii* Greene. Wats. Stems stout, spreading, 0.5-1 m. long; herbage roughish pubescent throughout; leaves rather thin, 3-7 cm. long, broadly ovate to ovate-lanceolate, acute or acuminate, sometimes slightly cordate, decurrent on the slender 2-4 cm. long petioles; involucre about 20-25 mm. long, 5-cleft to about the middle, the lobes acute; flowers usually 6, broadly funnel-form, 3-5 cm. long, rose color to purple, the tube greenish, acutely 5-lobed; stamens 5, equaling the calyx, shorter than the filiform style; fruit ovate-oblong, 6-8 mm. long, with 10 shallow furrows near the base and with as many intermediate dark lines. (*M. multiflora pubescens* Wats.)

Southern Sierra Nevada to San Diego County, chiefly on the desert slopes, Manzanita, *Davidson*, San Jacinto and Cuyamaca Mountains.

2. *M. californica* Gray. Stems ascending or spreading from a somewhat woody base, 3-6 dm. long; herbage viscid-pubescent; leaves rather thick, 1-3 cm. long, broadly ovate to cordate, obtuse or acute; petioles slender, 1-2 cm. long; involucre about 6 mm. long, acutely 5-cleft to near the middle; calyx narrowly campanulate, 10 mm. long, the lobes spreading, emarginate; stamens equaling the calyx and nearly equaling the style; fruit ovate, smooth, 3 mm. long.

Common in the foothills throughout our range. March-June.

2. ABRONIA Juss. SAND-VERBENA.

Ours perennial herbs, often prostrate and more or less viscid-pubescent, with thick opposite unequal leaves. Involucres of 5-15 somewhat scarious leaflets, enclosing

numerous sessile showy and fragrant flowers. Calyx salver-shaped, the lobes usually 5, obcordate or emarginate. Stamens usually 5, unequal, adnate to the calyx-tube and included. Style included; stigma linear-clavate. Fruit indurated, 3-5-winged; achene smooth, cylindric. Embryo with only 1 cotyledon.

1. *A. umbellata* Lam. Stems slender, prostrate and widely branching, 3-10 dm. long, viscid-puberulent; leaves nearly glabrous, broadly obovate to oblong, the margin rarely sinuate, 2-4 cm. long, narrowed to a slender petiole of equal length or longer; peduncles 5-10 cm. long; involucre bracts narrowly lanceolate, 4-6 mm. long, enclosing 10-15 flowers, forming an umbel-like head; calyx rose-purple, rarely whitish, 12-16 mm. long, lobes 5, emarginate; fruit oblong, attenuate at each end, 8-10 mm. long, glabrous; wings thin, broadest above and often truncate.

Common on the sand-dunes along the seashore.

2. *A. maritima* Nutt. Stems stout, the lower portion usually buried in the drifting sand, prostrate, succulent and viscid; leaves thick, broadly ovate to oblong, cuneate or rounded at base, 3-5 cm. long, vertical on stout petioles of about the same length; peduncles slightly exceeding the leaves; involucre bracts short, ovate-oblong, enclosing 10-15 flowers, forming a narrow head; calyx 1 cm. long, deep red; fruit viscid-pubescent; wings rather thick.

Common on the beach sands along the seashore.

Family 30. AIZOACEAE. CARPET-WEED FAMILY.

Ours herbs, very succulent, except *Mollugo*, with opposite or verticillate leaves. Calyx 5-lobed, herbaceous or petaloid, the tube adnate or free from the ovary. Petals numerous or wanting. Stamens 3-many, with slender filaments inserted on the calyx-tube. Styles 3-20. Fruit a capsule, 3-20-celled, dehiscence various. Seeds numerous, minute; embryo annular; endosperm scanty or copious.

Ovary free from the calyx; petals none.

Sepals 5; capsule 3-valved; leaves not succulent.

1. MOLLUGO.

Calyx-lobes 5, petaloid; capsule circumscissile; leaves succulent.

2. SESUVIUM.

Calyx-tube adnate to the ovary; petals and stamens numerous.

3. MESEMBRYANTHEMUM.

1. **MOLLUGO** L. CARPET-WEED.

Annuals, ours prostrate, glabrous, much-branched, with verticillate stipulate leaves. Stipules scarious, membranous, deciduous. Flowers axillary on long slender pedicels. Calyx 5-parted, persistent; sepals scarious-margined. Petals none. Stamens 3-5. Ovary ovoid or globose, 3-celled. Capsule 3-celled, 3-valved, loculicidally dehiscent.

1. **M. verticillata** L. Stem much branched, prostrate, 10-20 cm. long, glabrous, not succulent; leaves in whorls of 5's or 6's, spatulate to linear-lanceolate, entire, obtuse, 10-25 mm. long, narrowed to a short petiole; flowers 1.5-2 mm. broad; sepals oblong, slightly shorter than the ovoid capsule; capsule roughened by the projecting seeds; seeds minute, smooth and shining or slightly granular.

Growing in damp places near borders of pools. Garvanza, Davidson; Laguna, Orange County.

2. **SESUVIUM** L. SEA PURSLANE.

Stems prostrate or decumbent, fleshy with opposite exstipulate leaves. Flowers solitary in the axils, sessile or on short stout pedicels. Calyx-tube turbinate, free from the ovary, the lobes 5, often purplish within, oblong, obtuse. Petals none. Stamens 5-many; filaments united at the base into sets. Ovary 3-5-celled, with as many styles. Capsule membranous, ovate-oblong, circumscissile at the middle. Seeds many, minute, smooth.

1. **S. sessile** Pers. Stems prostrate, much branched, 1-3 dm. long or more; leaves broadly spatulate or linear, 1-4 cm. long; flowers sessile or nearly so, 6-10 mm. long; sepals ovate-lanceolate, scarious-margined, 6 mm. long; filaments united below the middle, red.

Occasional in low saline places. June-September.

3. **MESEMBRYANTHEMUM** L. ICE-PLANT.

Ours very fleshy maritime herbs, with opposite exstipulate leaves. Flowers large and showy, terminal and in the forks of the branches. Calyx-tube adnate to the ovary, the lobes 5, unequal, herbaceous. Petals numerous, linear. Stamens very numerous, with slender filaments, inserted with the petals on the tube of the calyx. Capsule 4-20-celled, with as many styles, dehiscing at the depressed summit by stellate valves. Seeds minute, many.

- Herbage smooth; leaves opposite; perennial 1. *M. aequilaterale*.
 Herbage covered with shining vescicles;
 leaves alternate: annuals.
 Leaves flat, ovate to spatulate. 2. *M. crystallinum*.
 Leaves semiterete, linear. 3. *M. nodiflorum*.

1. ***M. aequilaterale*** Haw. Stems prostrate, often forming extensive mats; leaves 3-angled, 4–6 cm. long, smooth; flowers solitary, sessile or nearly so, about 3 cm. broad; calyx-tube turbinate, 2–4 cm. long; the larger foliaceous lobes nearly as long; petals red; styles 6–10.

Common along the seashore.

2. ***M. crystallinum*** L. Annual or biennial, prostrate and widely branching, the herbage covered with white glistening papillæ; leaves flat, fleshy, clasping, broadly ovate or spatulate, undulate; flowers axillary, sessile or nearly so, white or pink; calyx-tube campanulate, 6–10 mm. long, lobes ovate, retuse or acute; stigmas 5.

Common in low saline places near the coast. May–June.

3. ***M. nodiflorum*** Haw. A prostrate branching annual with rather slender terete leaves; flowers white or whitish, small, about 1 cm. broad.

Not known within our limits, but occurring on Catalina Island and along the shore of the mainland from near Capistrano south. Abundant about San Diego.

Family 31. PORTULACACEAE.

PURSLANE FAMILY.

Herbs, generally fleshy or succulent, with alternate or opposite leaves and regular but unsymmetrical perfect flowers. Sepals commonly 2. Petals 4 or 5, rarely more, hypogynous, equal in number to the petals and opposite them or fewer; anthers 2-celled, longitudinally dehiscent. Ovary 1-celled; styles 2–3-cleft or divided; ovules 2–many, amphitropous. Capsule membranous or crustaceous, circumscissile or 3-valved. Seeds 2–many, reniform-globose or compressed; embryo curved; endosperm farinaceous.

Sepals 2, distinct, free from the ovary, persistent; ovary 3-valved.

Styles 2-cleft; sepals unequal, hyaline.

Styles 3-cleft; sepals equal, herbaceous.

Stamens more than 5; seeds many, smooth. 1. CALANDRINIA.

Stamens usually 3; seeds few, tuberculate. 3. MONTIA.

Sepals 2, united at the base, adnate to the ovary; ovary circumscissile.

2. CALYPTRIDUM.

4. PORTULACA.

1. **CALANDRINIA** H. B. K.

Low succulent herbs with alternate or radical leaves, and purplish flowers in bracteolate racemes. Sepals 2, green and persistent. Petals mostly 5. Stamens 5–15 or sometimes only 3. Ovary free, many-ovuled, style 3-cleft, short. Capsule ovoid, membranous, 3-valved. Seeds smooth or minutely tuberculate.

1. *C. caulescens menziesii* (Hook.) Gray. Stems decumbent or ascending, glabrous or sparsely pubescent, 10–30 cm. long, leafy; leaves linear to oblanceolate, the lower petioled, 3–6 cm. long; flowers scattered along the branches; sepals ovate, acute or acuminate, carinate, the keel and margins entire or sparsely ciliolate; petals broadly obovate, 5–15 mm. long, rose-red or rarely white; seeds black and shining. (*C. menziesii* (Hook.) T. & G.; *C. elegans* Spach.)

Common on the mesas, especially in the coast region. February–May.

2. *C. maritima* Nutt. Stems glaucous, depressed, 6–10 cm. long; leaves mostly rosulate at the base, obovate to obovate-spatulate, the upper bract-like; flowers in a loose naked cyme; calyx ovate, acute, about 3 mm. long; petals 5–6 mm. long, rose-purple; capsule ovoid, 4 mm. long, acutish; seeds dull grayish.

Along the seashore at Santa Monica; *Davidson*.

2. **CALYPTRIDIMUM** Nutt.

Glabrous and rather succulent herbs, branching from the base, the branches prostrate or ascending. Flowers small, ephemeral, solitary or clustered in scorpioid spikes. Sepals 2, broadly ovate or cordate-orbicular, scarious, persistent. Petals 2–4. Stamens 1–3. Style bifid. Capsule membranaceous, 2-valved, 6–12-seeded.

1. *C. monandrum* Nutt. Stems prostrate, much branched, 2–8 cm. long; leaves spatulate, about equaling the branches, mostly radical, the cauline similar but usually smaller; sepals 2, narrowly scarious margined, 1.5 mm. long; petals 2–3, about equaling the sepals; stamens 1, shorter than the petals; filaments subulate; style short, shortly 2-lobed or entire; capsule linear, becoming much exserted, bearing the withered petals at the apex; seeds 5–10.

Frequent on sand-dunes along the seashore and occasional in the foothill region. March–May.

3. **MONTIA** L. MINER'S LETTUCE.

Low glabrous and succulent herbs with delicate pale rose-colored or white flowers in loose axillary or terminal, simple or compound racemes. Sepals 2, rarely 3, per-

sistent. Petals usually 5, rarely 3 or wanting, more or less united at base, usually slightly unequal. Stamens 3-5, inserted on the corolla opposite the lobes. Ovary 3-ovuled. Capsule 3-valved, 3-seeded.

1. *M. perfoliata* (Donn) Howell. Scapose stems 10-30 cm. high; leaves long petioled, oblanceolate to ovate or deltoid; involucre bracts completely joined, forming a perfoliate disk; flowers in short or rather long peduncled racemes; sepals ovate, 2-3 mm. long; petals 3-5 mm. long, white or rose color; seeds lenticular, black and shining, minutely granular. (*Claytonia perfoliata* Donn.)

Common in moist shady places below 4000 feet altitude. February-May.

2. *M. spathulata* (Dougl.) Howell. Low and rather dense, 3-10 cm. high; radical leaves linear or spatulate-linear, little exceeded by the flowering stems; cauline leaves from spatulate-ovate to lanceolate, almost distinct or connate upon one side into an obcordate or 2-lobed involucre; inflorescence 1-2 cm. long; flowers small; petals 2-4 mm. long; seeds black, shining, granulated. (*Claytonia spathulata* Dougl.)

Kings Canyon, *Davidson*. May.

4. PORTULACA L. PURSLANE.

Low succulent prostrate or ascending herbs with alternate or opposite leaves and scarious or setaceous stipules. Flowers axillary or terminal, ephemeral, (ours) yellow. Sepals 2, coherent at the base into a tube and adnate to the base of the ovary, the free upper portion at length deciduous. Petals 4-6. Stamens 4-20, perigynous with the petals. Style 1, deeply 3-8-cleft. Capsule circumscissile near the middle, many-seeded.

1. *P. oleracea* L. Stems prostrate, 1-5 dm. long; leaves fleshy, glabrous, obovate to spatulate, rounded at the apex; flowers sessile, axillary; stipules minute; sepals acute, carinate; petals yellow, 2-4 mm. long; stigmas 5; capsule 6-10 mm. long; seeds dull black, finely tuberculate.

Cultivated grounds and waste places. May-August.

Family 32. CARYOPHYLLACEAE. PINK FAMILY.

Annual or perennial herbs, rarely lignescent at base, with nodose stems and opposite entire leaves. Flowers regular, perfect or rarely unisexual by abortion. Sepals 4-5, united into a tube or distinct. Petals as many (or none), often emarginate-toothed or deeply bifid. Sta-

mens usually as many as petals and alternating with them; filaments sometimes slightly cohering at the base, anthers introrse. Styles 2-5, free or united below; ovary free, 1-celled or imperfectly 2-5-celled at the base; placenta axial; ovules usually numerous. Fruit a many-seeded capsule, opening by 2-5 entire or bifid valves, or 1-seeded and indehiscent. Embryo straight or curved; endosperm present.

Ovary several-many-seeded, becoming a capsule.

Sepals united.

1. *SILENE*.

Sepals distinct.

Stipules none.

Styles 3-4.

Petals divided nearly to the base.

2. *ALSINE*.

Petals entire.

5. *ARENARIA*.

Styles 5.

Petals retuse or bifid.

3. *CERASTIUM*.

Petals entire or slightly emarginate.

4. *SAGINA*.

Stipules present.

Leaves not cuspidate.

Petals rather large or rarely none;
styles distinct.

Leaves whorled.

6. *SPERGULA*.

Leaves opposite.

7. *TISSA*.

Petals minute; styles united below.

8. *POLYCARPON*.

Leaves cuspidate.

9. *LOEFLINGIA*.

Ovary 1-ovuled, becoming a utricle.

10. *PENTACAENA*.

1. *SILENE* L. CATCH-FLY.

Annual or perennial herbs with clustered or solitary stems and bright red or usually white flowers. Calyx more or less inflated, tubular, ovoid or campanulate, 5-toothed or 5-cleft, 10-many-nerved. Petals 5, narrow, clawed. Stamens 10. Styles 3, rarely 4-5; ovary 1-celled or incompletely 2-4-celled. Capsule dehiscent by 6 or rarely 3 apical teeth. Seeds usually spiny or tubercled.

Calyx 18-20-ribbed.

1. *S. multinerva*.

Calyx 10-nerved.

Annuals.

Glandular-hirsute throughout.

2. *S. anglica*.

Upper internodes with a viscid belt, otherwise glabrous.

3. *S. antirrhina*.

Perennials, glandular pubescent.

Petals 4- (or more) cleft.

Scarlet.

Yellowish white.

Petals 2-cleft, pinkish.

4. *S. laciniata*.

5. *S. parishii*.

6. *S. verecunda*.

1. *S. multinerva* Wats. Annual, erect, 25–35 cm. high, pubescent throughout and somewhat viscid-glandular above; leaves narrowly oblong or linear, acute; inflorescence cymose with unequal branches; calyx ovate in fruit, contracted above, 10 mm. long, 18–23-ribbed; petals small, not exceeding the subulate calyx-teeth, purplish, unappendaged; capsule narrowly ovate.

Occasional about Santa Monica, *Hasse*.

2. *S. anglica* L. Stems erect, simple or sparingly branched, 25–40 cm. high, hirsute with spreading hairs, leaves spatulate-obovate, hirsute on both sides, 2–4 cm. long; racemes terminal, 1-sided; flowers on pedicels 2–4 cm. long; calyx villous-hirsute, slender, becoming ovoid in fruit; petals little exceeding the calyx, their blades obovate, somewhat bifid, toothed or entire. (*S. gallica* L.)

A common introduced plant of fields and roadsides. Native of Europe. March–May.

3. *S. antirrhina* L. Stems erect, slender, sparingly branched, the middle of the upper internodes with a viscid belt, otherwise glabrous; leaves oblong-lanceolate or linear, 2–3 cm. long, usually acute; inflorescence paniculate; pedicels filiform, 1–3.5 cm. long; calyx glabrous, bright green, ovoid in fruit, 8 mm. long; petals small, pink, or white, emarginate or bifid; ovary nearly sessile.

Frequent in the foothills. April.

4. *S. laciniata* Cav. Finely pubescent, glandular above; stems usually much branched and widely spreading, erect or decumbent, 3–10 dm. long; leaves lanceolate-linear, scabrous, ciliolate, narrowed to a sessile base; calyx subcylindric or clavate, 15–20 mm. long; petals bright scarlet, 4-cleft, much exceeding the calyx; capsule oblong, usually exerted at maturity.

Common in the chaparral belt. May–August.

5. *S. parishii* Wats. Stems several, decumbent, 8–12 cm. long; leaves lanceolate, acuminate, sessile, 2–4 cm. long, grayish pubescent and glandular; flowers aggregated at the ends of the branches; calyx 25 mm. long, its teeth subulate; petals scarcely exerted, cleft in 4 or more filiform lobes.

San Antonio Mountains, *Johnston*, also in the San Bernardino and San Jacinto Mountains.

6. *S. verecunda* Wats. Finely hoary pubescent, glandular-viscid above; stems several, usually erect, 20–40 cm. high, leafy below; leaves narrowly lanceolate, oblanceolate or spatulate to linear, acute, 3–5 cm. long; flowers terminal on the short branches or borne in 3-flowered lateral cymes; calyx in fruit clavate or obovate; petals rose color, blades shorter than the pubescent claws, 2-cleft, appendages oblong or lanceolate, obtuse and often toothed at the apex; capsule ovoid, stipitate.

Common in the San Gabriel and San Bernardino Mountains in the coniferous belt; also summit of Santiago Peak, Santa Ana Mountains.

2. ALSINE L.

Tufted annuals, diffuse with cymose white flowers. Sepals usually 5. Petals 5, 2-cleft or 2-parted, rarely none. Stamens 10 or less, hypogynous. Ovary 1-celled, several-many-ovuled. Styles commonly 3, rarely 4-5, usually opposite the sepals. Capsule globose to oblong, dehiscent by twice as many valves as styles. Seeds smooth or roughened.

1. *A. media* L. Weak and decumbent or ascending, 10-40 cm. long, glabrous except a line of hairs along the stem and branches; leaves ovate or oval, 1-3 cm. long, the upper sessile, the lower petioled; flowers 4-8 mm. broad, in terminal leafy cymes or axillary; pedicels slender; sepals oblong, mostly acute, longer than the 2-parted petals; capsule ovoid, longer than the calyx; seeds rough. (*Stellaria media* Cyrill.)

Common in shady places. February-April.

2. *A. nitens* (Nutt.) Greene. Very slender, erect annual; stems filiform, several times forked, pubescent below; leaves mostly basal, the lowest ovate, acute, about 4 mm. long, on slender petioles of about the same length, the upper sessile, lance-linear, acute, 6-10 mm. long; sepals very acute, scarious-margined, 1-3-nerved; petals half as long as the sepals or wanting; capsule oblong, about equaling the sepals. (*Stellaria nitens* Nutt.)

Common in the foothills in somewhat shady places. March-May.

3. CERASTIUM L. CHICKWEED.

Annual or perennial, pubescent or hirsute herbs, with terminal dichotomous cymes of white flowers. Sepals 5, rarely 4. Petals of the same number, emarginate or bifid, rarely wanting. Stamens 10, rarely fewer. Styles equal in number to the sepals and opposite them, or fewer. Capsule cylindric, 1-celled, many-ovuled, often curved, dehiscent by 10, rarely 8 apical teeth. Seeds rough.

1. *C. viscosum* L. Annual, tufted; stems ascending or spreading, densely viscid-pubescent, 10-30 cm. long; leaves ovate or obovate, or the lower spatulate, 8-25 mm. long, obtuse; bracts small, herbaceous; flowers 4-6 mm. broad, in glomerate cymes, becoming paniculate in fruit; pedicels shorter than or equaling the acute sepals; petals shorter than the sepals, bifid.

Frequent in waste places.

2. *C. vulgatum* L. Biennial or perennial, viscid-pubescent, tufted, erect or ascending, 15-45 cm. long; lower leaves spatulate-oblong, obtuse; upper leaves oblong, 12-25 mm. long, acute or obtuse; bracts scarious-margined; inflorescence cymose, loose, the

pedicels at length much longer than the calyx; sepals obtuse or acute; petals exceeding the sepals, 4–6 mm. long, 2-cleft; capsule usually curved upward. (*C. trivale* Link.)

Frequent in lawns.

4. *SAGINA* L.

Low tufted annual or perennial herbs, with subulate leaves and small pedicelled whitish flowers. Sepals 4–5. Petals of the same number, entire, emarginate or none. Stamens of the same number or twice as many or sometimes fewer. Styles as many as the sepals and alternate with them. Capsule 4–5-valved, at length dehiscent to the base, the valves opposite the sepals.

1. *S. occidentalis* Wats. Very slender glabrous annual, with several decumbent or ascending stems, these 5–15 cm. long; leaves nearly filiform but flattened above; pedicels exceeding the leaves, 14–25 mm. long; flowers 5-merous, 4–5 mm. broad; capsule 3.5 mm. long.

Occasional in the Santa Monica Mountains and the Verdugo Hills.

5. *ARENARIA* L.

Annual or perennial herbs, with sessile leaves and terminal cymose or capitate, rarely axillary and solitary white flowers. Sepals 5. Petals 5, entire or scarcely emarginate, rarely none. Stamens 10. Styles usually 3, rarely 2–5. Ovary 1-celled, many-ovuled. Capsule globose or oblong, dehiscent at the apex by as many valves or teeth as there are styles, or twice as many. Seeds reniform-globose or compressed.

Valves of the capsule 2-cleft.

Valves of the capsule entire.

Annual.

Perennial.

1. *A. fendleri*.

2. *A. douglasii*.

3. *A. paludicola*.

1. *A. fendleri* Gray. Stems numerous from a thick perennial root, glaucous, glandular-pubescent above, erect, leafy, 10–35 cm. high; basal leaves gramineous, setaceous, ciliolate or smooth, 5–10 cm. long, somewhat pungent; cauline becoming reduced, connate and sheathing at the base; inflorescence dichotomous, few-many-flowered; sepals lanceolate, alternate, glandular, 4–6 mm. long; petals white or pale yellow, obovate, slightly exceeding the sepals; capsule 3–4 mm. long.

Los Angeles, *Nevin*.

2. *A. douglasii* Fenzl. Annual, glabrous or sparsely glandular-pubescent and somewhat viscid; stems much branched, 5–30 cm. high; leaves filiform; peduncles filiform; flowers numerous, 8–10 mm.

broad; sepals ovate, thin-margined, obscurely or rather distinctly ribbed; petals obovate, slightly exceeding the calyx; capsule subglobose, somewhat exceeding the sepals; seeds about 1.5 mm. broad, reniform, broadly margined, smooth or with fine radiating striae.

Frequent in the foothill region, in open stony places. March-May.

3. *A. paludicola* Robinson. Perennial, glabrous and flaccid, stems several, subsimple, procumbent, rooting at the lower joints, leafy throughout; leaves linear-lanceolate, acute, 2-3 cm. long, somewhat connate, margins slightly scarious; peduncles solitary in the axils, 2-5 cm. long, spreading or recurved; sepals nerveless, acutish, 3-4 mm. long; petals obovate, 6-8 mm. long. (*A. palustris* Wats.)

Growing in marshy ground, near Los Angeles, *Davidson*.

6. SPERGULA L. CORN SPURRY.

Annual branched herbs, with subulate stipulate leaves, much fascicled in the axils. Flowers white, in terminal cymes. Sepals and petals 5. Stamens 5 or 10. Styles 3, alternate with the sepals. Capsule 5-valved, the valves opposite the sepals. Seeds compressed, acutely margined or winged.

1. *S. arvensis* L. Slender, glabrous or sparingly pubescent, branching from the base, erect or ascending, 15-45 cm. high; leaves narrowly linear or subulate, 2.5-5 cm. long, clustered at the nodes, appearing verticillate; stipules minute, connate; flowers 4-6 mm. broad, numerous, in loose terminal cymes; pedicels slender, divaricate; sepals ovate, 3-4 mm. long, slightly longer than the petals; stamens 10 or 5; capsule ovoid, longer than the calyx.

Occasional about Los Angeles and Pasadena. Native of Europe. March-April.

7. TISSA Adans.

Low annual or perennial herbs, with fleshy linear or setaceous leaves, and small pink or whitish flowers in terminal racemose, bracted or leafy cymes. Stipules scarious, usually conspicuous. Sepals 5. Petals 5, fewer or none, entire. Stamens 2-10. Ovary 1-celled, many-ovuled; styles 3. Capsule 3-valved to the base. Seeds reniform-globose or compressed, smooth, winged or tuberculate. (*Buda* Adans.; *Spergularia* Pursh.)

Annals with fibrous roots.

Stems stout, somewhat fleshy; stamens 10.

Stems slender; stamens 2-5.

Flowers subsessile.

Flowers pedicellate.

Perennial with a thick fleshy root.

1. *T. marina*.

2. *T. tenuis*.

3. *T. gracilis*.

4. *T. macrotheca*.

1. *T. marina* (L.) Britton. Stout, erect or ascending, more or less glandular-pubescent, 3 dm. high or less; leaves fleshy, 2-4 cm. long, linear, clustered in the axils; petals rose color; stamens 10; mature capsule 5-8 mm. long; seeds smooth or somewhat roughened, sometimes margined.

Common in salt marshes toward the coast.

2. *T. tenuis* Greene. Slender, diffusely branching, forming depressed mats about 3 dm. broad, glabrous or nearly so; leaves narrowly linear, 2.5 cm. long; stipules inconspicuous; flowers minute, numerous, cymosely crowded on all but the lower parts of the branches, subsessile; sepals obtuse, less than 2 mm. long; petals wanting; stamens 2; styles 3; capsule 3-sided, 6-8 mm. long; seeds numerous, minute, reddish-brown, smooth, wingless.

Santa Monica, *Nevin*.

3. *T. gracilis* (Wats.) Britton. Much resembling the last, but the flowers on pedicels 2-4 mm. long; capsule 2 mm. long; seeds triangular-pyriform, strongly rough-tuberculate.

Occasional on the mesas in low adobe soil; Wilmington; Inglewood. March-April.

4. *T. macrotheca* (Hornem.) Britton. Perennial, from a fleshy root; glandular-pubescent or nearly smooth; stems stout, ascending, 4 dm. high or less, branching from the base; leaves broadly linear, 4 cm. long or less; flowers on pedicels usually about 15 mm. long; calyx-lobes 6-8 mm. long; petals rose color; stamens 10; capsule equaling the calyx-lobes; seeds winged, smooth.

Common in salt marshes and alkaline flats. May-July.

8. POLYCARPON L.

Low diffuse, dichotomously branched annuals with flat stipulate leaves and minute cymose flowers. Sepals 5, carinate-concave. Petals 5, minute, hyaline. Stamens 3-5. Ovary 1-celled; style short, 3-cleft. Capsule 3-valved, several-seeded.

1. *P. depressum* Nutt. Very slender, prostrate, the many branches 2.5-5 cm. long; leaves opposite, spatulate, glabrous; stipules small, narrow; flowers minute; the pedicels with small bracts; petals very narrow, shorter than the sepals, entire; capsule globose, 6-12-seeded.

On seashore sand-dunes, and in sandy soil in the foothills. Not common. March-May.

9. LOEFLINGIA L.

Low much branched rather rigid and pungent-leaved annuals. Leaves with adnate and connate setaceous stipules. Flowers small, sessile in the axils of the leaves and branches. Sepals 5, rigid, carinate. Petals minute or none. Capsule 2-valved, several-seeded.

1. *L. squarrosa* Nutt. Much branched, prostrate or ascending, 5–15 cm. high; herbage glandular-pubescent; leaves and sepals subulate setaceous, rigid and recurved, the leaves 4–6 mm. long, the sepals somewhat shorter; capsule elongated, triquetrous, exserted, many-seeded.

Streets of Los Angeles and Pasadena, *Davidson, Mc Clatchie*.

10. PENTACAENA Bartl.

Tufted perennials with subulate pungent leaves and silvery-hyaline stipules. Flowers sessile, clustered in the axils. Sepals 5, unequal, hooded, the 3 outer larger and with a stout divergent terminal spine. Petals minute, scale-like. Stamens 3–5, inserted at the base of the sepals. Style very short, 2-cleft. Utricle enclosed in the rigid persistent calyx.

1. *P. ramosissima* H. & A. Stems prostrate, forming dense mats 15–30 cm. broad, woolly-pubescent; leaves crowded on the stems, 6 mm. long; sepals woolly, except the divergent apex; utricle apiculate.

Common in sandy soil along the coast.

Family 33. CERATOPHYLLACEAE.

HORNWORT FAMILY.

Submerged aquatics with slender widely branching stems and verticillate leaves, the monoecious or dioecious flowers solitary and sessile in the axils. Perianth many-parted, the segments entire or toothed. Stamens numerous, crowded on a flat or convex receptacle; anthers sessile or nearly so, linear oblong, extrorse, appendaged. Ovary superior, 1-celled; ovule 1, pendulous; style filiform. Fruit an indehiscent nut or achene. Endosperm none; cotyledons 4, verticillate.

1. CERATOPHYLLUM L. HORNWORT.

Leaves crowded in verticils, linear or filiform, spinulose-serrulate, forked. Staminate and pistillate flowers, generally at different nodes. Stamens 10–20; anthers about equaling the perianth. Ovary and fruit slightly exceeding the sepals, the fruit beaked with the long persistent style.

1. *C. demersum* L. Stems 2-9 dm. long, leaves 2-3 times forked, the end of the segments capillary and rigid, 8-25 mm. long, fruit oval, 4-6 mm. long, smooth or tuberculate, sometimes winged or with 2 basal spurs on each side.

In ponds and slow streams, frequent throughout our range. May-July.

Family 34. RANUNCULACEAE. CROWFOOT FAMILY.

Annual or perennial herbs or rarely climbing shrubs, with alternate or opposite, simple or compound, exstipulate leaves. Flowers regular or irregular. Sepals 3-15, generally caducous, often petal-like. Petals usually of the same number, sometimes wanting. Stamens many, hypogynous, longitudinally dehiscent. Carpels many or rarely solitary, 1-celled, 1-many-ovuled. Ovules anatropous. Fruit achenes, follicles or berries. Endosperm present.

Flowers perfect.

Fruit a follicle.

Sepals herbaceous, persistent.

Sepals petal-like, deciduous.

Petals all spurred.

Upper sepal spurred.

Fruit an achene.

Woody climbers; petals wanting.

Herbs.

Achene longitudinally nerved.

Achene not longitudinally nerved.

Flowers dioecious, greenish; petals none.

1. PAEONIA.

2. AQUILEGIA.

3. DELPHINIUM.

4. CLEMATIS.

5. OXYGRAPHIS.

6. RANUNCULUS.

7. THALICTRUM.

1. PAEONIA L. PEONY.

Perennial herbs with ternately or pinnately compound leaves and large showy flowers. Sepals 5 or 6, herbaceous and persistent. Petals of the same number, borne with the numerous stamens on a fleshy disk. Style short or none. Follicles 2-5, thick and leathery, several-seeded.

1. *P. brownii* Dougl. Glaucous and somewhat fleshy, 20-40 cm. high; leaves mostly radical, ternately or biternately divided, the lobes obovate to linear-spatulate; peduncles 2.5-5 cm. long; petals about equaling the sepals, brownish-red; follicles usually 5, broadly oblong, smooth, 2-4 cm. long.

Occasional in the foothills throughout our range. Jan-March.

2. **AQUILEGIA** L. COLUMBINE.

Erect branching perennial herbs with ternately compound leaves and large showy flowers. Sepals 5, regular, petaloid, deciduous. Petals concave, spurred at base. Stamens numerous, the inner ones reduced to staminodia. Carpels 5, sessile, many-ovuled, forming heads of follicles in fruit.

1. *A. truncata* F. & M. Glabrous or somewhat viscid-pubescent, 6–12 dm. high; leaves large, biternate, the leaflets roundish, cuneate at base, incised, the segments lobed or crenately toothed, long-petioled; flowers scarlet, tinged with yellow, reflexed; sepals truncate, widely spreading, shorter than the spurs; follicles 2–3 cm. long, veined, beaked by the long persistent style.

Occasional in moist shady places, mostly above 2500 feet altitude. May–July.

3. **DELPHINIUM** L. LARKSPUR.

Annual, or ours perennial, erect branching herbs with palmately divided leaves, and racemose or paniculate showy flowers. Sepals 5, the posterior one prolonged into a spur. Petals usually 4, the 2 posterior spurred. Carpels few, becoming many-seeded follicles.

Flowers not red.

Stems hirsute, at least below.

2. *D. variegatum*.

Stems glabrous or puberulent.

Divisions of the leaves linear.

1. *D. parryi*.

Divisions of the leaves round-ovate to cuneate.

3. *D. decorum*.

Flowers red.

4. *D. cardinale*.

1. *D. parryi* Gray. Glabrous or minutely and sparsely puberulent; stems erect, 4–8 dm. high, from rather simple or few-fascicled, elongated roots, neither fusiform nor tuberiform; leaves 3–5-parted, the divisions and few lobes linear, obtuse; raceme virgate, at length rather loose; sepals mostly broadly oblong, about 10–15 mm. long, equaling the spur, deep blue, sparsely and minutely puberulent or glabrate; upper petals white-margined, 7–8 mm. long; follicles about 15 mm. long, apparently glabrous and shining, but minutely puberulent under a lens.

Frequent in the foothills throughout our region. April–June.

2. *D. variegatum* T. & G. Usually hirsute-pubescent below; stems erect and rather rigid, 3–6 dm. high, from rather short and closely fascicled, somewhat fusiform roots; leaves 3–5-parted, the divisions and lobes broadly linear, obtuse; raceme mostly few-flowered and rather close, sepals roundish-obovate or oval, 15–20 mm. long, equaling or exceeding the spur, violet-blue or purple, at least the spur grayish puberulent; upper petals entirely white or

nearly so, about 10 mm. long; follicles about 15 mm. long, grayish puberulent.

Playa del Rey. March-May.

3. *D. decorum* F. & M. Glabrous throughout or pedicels slightly puberulent; stem lax, 2-5 dm. high; lowest leaves reniform or orbicular in outline, 3-5-lobed or 3-5-parted, the divisions round-ovate to cuneate, entire or slightly 2-5-lobed; upper leaves with narrow divisions; raceme often paniculate, sparsely flowered; pedicels slender, spreading; sepals oval, 10-15 mm. long, equaling the spur, blue; follicles 10-12 mm. long, erect or slightly spreading.

Frequent in the San Gabriel Mountains, apparently less so in the Santa Monica Mountains and foothills about Los Angeles.

3a. *D. decorum patens* (Benth.) Gray. More slender than the type, sometimes obscurely and sparsely pubescent; stems erect; raceme closer; pedicels ascending in fruit; sepals 8-10 mm. long.

Frequent in the foothills of all our mountains.

5. *D. cardinale* Hook. Stems about 1 m. high, branching above; leaves deeply parted into narrow divisions, with long linear or lanceolate lobes; inflorescence racemose or paniculate, many-flowered; sepals obovate, 10-15 mm. long, half as long as the narrow spur, deep red; petals usually somewhat yellowish.

Frequent in the foothills, mostly below 3500 feet altitude. June-July.

4. CLEMATIS. VIRGIN'S BOWER.

Ours woody climbers with opposite mostly pinnately divided leaves. Sepals usually 4, petaloid. Petals none. Stamens numerous. Pistils many, becoming achenes with long plumose styles.

Ovaries and achenes pubescent.

Leaves 5-7-foliolate.

1. *C. ligusticifolia*.

Leaves 3-foliolate.

2. *C. lasiantha*.

Ovaries and achenes glabrous.

3. *C. pauciflora*.

1. *C. ligusticifolia* Nutt. Somewhat pubescent or nearly glabrous; leaves pinnately 5-7-foliolate, or the lowest pair of leaflets again 3-foliolate, ovate, cordate or obtuse at base, acute or acuminate, mostly incised or rather sharply toothed; inflorescence paniculate, many-flowered; flowers 2-4 cm. broad, cream-colored; achenes densely silky-pubescent.

Common in canyons in all our mountains and occasionally extending into the valleys along streams. May-July.

2. *C. lasiantha* Nutt. Tomentose-pubescent; leaves 3-foliolate, leaflets 2.5-5 cm. long, mostly broadly ovate, somewhat 3-lobed and coarsely toothed, the teeth rounded; flowers polygamous, solitary or 3-5 on bibracteolate peduncles, 3-6 cm. broad; sepals broadly oblong, cream-colored; achenes pubescent.

Common in the chaparral belt, clambering over shrubs. April-May.

3. *C. pauciflora* Nutt. A low woody climber, with short-jointed stems, usually scrambling over chaparral; leaves 3-5-foliolate, leaflets 1-2 cm. long, cordate to cuneate-obovate, usually 3-toothed or 3-lobed, somewhat silky tomentose; flowers dioecious, solitary or in few-flowered panicles, with slender pedicels; sepals thin, creamy white, 8-12 mm. long; achenes glabrous.

This is the common clematis about San Diego, extending to the foothills of the San Jacinto Mountains. It has also been found by the author in the San Gabriel wash near Azusa.

5. OXYGRAPHIS Bunge.

Perennial herbs with crenate, dentate or lobed, long petioled leaves and small yellow flowers, solitary or 2-7 together on scapes or scape-like peduncles. Sepals usually 5, spreading, at length deciduous. Petals 5-15, with a nectar-pit near the base of each. Stamens and pistils numerous. Head of fruit oblong or oval or rarely subglobose. Achenes compressed, longitudinally striate, without a hard coat.

1. *O. cymbalaria* (Pursh) Prantl. Low, glabrous, spreading by runners; leaves mostly basal, slender petioled, cordate-oval or reniform crenate, 4-18 mm. long; scapes 3-12 cm. long, sometimes bearing one or more leaves at the base; flowers 1-7, 6-8 mm. broad; head of fruit oblong, 6-16 mm. long; achenes compressed, somewhat swollen, distinctly striate, minutely sharp-pointed. (*Ranunculus cymbalaria* Pursh.)

Frequent throughout our range in low moist places. March-July.

6. RANUNCULUS L. BUTTERCUP.

Annual or perennial herbs, with alternate or mostly basal simple entire, lobed, divided or dissected leaves, and yellow, white or sometimes red flowers. Sepals mostly 5, deciduous. Petals equal in number or more, conspicuous or minute, bearing a nectariferous pit and sometimes a scale at base of blade. Achenes capitate or rarely spicate, generally flattened, smooth, papillose or pectinate, sometimes transversely wrinkled, beaked with a minute or elongated style.

Terrestrial herbs; flowers yellow.

Perennial; flowers showy, 1-2 cm. broad.

Annual; flowers minute.

Aquatic herbs; leaves finely dissected.

1. *R. californicus*.

2. *R. hebecarpus*.

3. *R. trichophyllus*.

1. *R. californicus* Benth. Mostly pubescent and hirsute; stems branching, 2-6 dm. high; radical leaves usually pinnately ternate,

the leaflets laciniately cut into 3-7, usually linear lobes; flowers 1-2 cm. broad; petals 7-15; achenes 3.5 mm. long, flattened, slightly margined, beaked with the short straight or slightly curved style.

Frequent on the mesas and in open places in the foothills. February-April.

2. *R. hebecarpus* H. & A. Slender, 15-30 cm. high, branched, pilose-pubescent; leaves of rounded outline, deeply lobed or cleft, the segments 3-lobed; flowers minute, on filiform pedicels; achenes few in a globose head, rounded and flattened, papillose and pubescent; beak short, recurved.

Growing in moist shady places, not common. Oak Knoll; Santa Monica Mountains. March-May.

3. *R. trichophyllus* Chaix. Submerged; stems branching, usually 3 dm. long or more; leaves petioled, 2.5-5 cm. long, flaccid and collapsing when withdrawn from the water, repeatedly forked with capillary divisions; flowers white, 12-18 mm. broad, on stout peduncles 2.5-5 cm. long; achenes transversely wrinkled.

Occasional in ponds and slow-running streams. May-August.

7. *THALICTRUM* L. MEADOW-RUE.

Erect perennial herbs with ternately decompound leaves and (ours) with small greenish dioecious panicked flowers. Sepals 4-5. Petals none. Stamens many. Achenes few-ribbed or nerved, stipitate or nearly sessile.

1. *T. polycarpum* Wats. Usually robust, 6-12 dm. high, glabrous throughout; leaves of rather thin texture; achenes numerous, forming a globular head in fruit, 6 mm. high, vesicular, obovate or somewhat orbicular, usually only the midveins apparent.

Common in the foothill region, mostly below 4000 feet altitude. April-June.

Family 35. BERBERIDACEAE. BARBERRY FAMILY.

Shrubs or herbs with alternate or basal, simple or compound leaves, with or without stipules, and solitary or racemed, mostly terminal, perfect flowers. Sepals and petals generally imbricated in several series. Stamens as many as the petals and opposite them, hypogynous; anthers extrorse, opening by valves. Pistil 1; style short; ovules 2-many, anatropous. Fruit a berry or capsule.

1. *ODOSTEMON* Raf. BARBERRY.

Shrubs with yellow wood and inner bark, bitter. Leaves persistent, pinnately compound and spinulose-

dentate. Flowers racemose, yellow. Sepals 6-9, petaloid, bracted, each with 2 glands at base. Petals 6, imbricated in 2 series. Stamens 6, irritable, closing around the stigma when touched on the inner face near the base. Pistil 1; stigma peltate. Berry 1-few-seeded.

1. *O. dictyota* (Jepson.) Abrams. Shrub 4-12 dm. high, rather sparsely leafy; leaflets 5-7, glaucescent on the upper surface, somewhat paler beneath and prominently reticulate-veiny, strongly undulate, the margins spinose-dentate, the teeth few and rather remote; racemes terminal, clustered, 2-5 cm. long; berries blue-black, with bloom. (*Berberis dictyota* Jepson.)

Occasional on dry ridges. Near Glendale, *Davidson*; Switzer's trail, San Gabriel Mountains, *F. Grinnell*.

2. *O. nevinii* (Gray.) Abrams. Shrub 2-3 m. high; leaflets pale, lanceolate or oblong-lanceolate, often acuminate, teeth not remote, spinulose-serrate, 1-2.5 cm. long; racemes loosely 5-7-flowered, equaling or surpassing the leaves; pedicels slender. (*Berberis nevinii* Gray.)

Fernando, where it was first collected by Nevin.

Family 36. LAURACEAE. LAUREL FAMILY.

Aromatic trees or shrubs with alternate entire minutely punctate exstipulate leaves and perfect or unisexual yellow or greenish flowers, in panicles or racemes. Calyx 4-6-parted, segments imbricated in 2 series. Corolla none. Stamens in 3-4 series, some of them often imperfect; anthers 2-4-celled, opening by valves. Ovary superior, free from the calyx, 1-celled; ovule solitary, anatropous, pendulose; style 1; stigma 1. Fruit a 1-seeded drupe.

1. UMBELLULARIA Nutt. CALIFORNIA LAUREL or BAY TREE.

Trees with thick evergreen petioled leaves and perfect flowers, borne in terminal or axillary pedunculate umbels, which are included before expansion in an involucre consisting of 4 broad deciduous bracts. Calyx 6-parted, deciduous. Stamens 9, inserted on the throat in 3 rows, the 3 inner with a fleshy 2-lobed stipitate gland at the base, alternating with 3 ligulate staminodia; anthers 4, 4-valved, the outer introrse, the inner extrorse. The stigma dilated, somewhat lobed. Drupe subglobose or ovoid, subtended by the thickened base of the calyx.

1. *U. californica* (H. & A.) Nutt. Tree 4-15 m. high, growing parts and inflorescence somewhat puberulent; leaves shining, dark green, lanceolate-oblong, 5-10 cm. long; peduncles in 4 terminal panicles or solitary in the upper axils, 6-10-flowered; sepals 3-5 mm. long, oblong-ovate; stamens included; drupes solitary or 2-3 in a cluster, 2 cm. long, becoming dark purple with thin pulp and stone.

Throughout our range in canyons, or on mountain slopes where it is often reduced to an arborescent shrub. January-April. Fruit in November.

Family 37. PAPAVERACEAE. POPPY FAMILY.

Herbs or rarely shrubs with white, yellow or colorless sap and alternate exstipulate leaves or the upper rarely opposite. Flowers solitary or in clusters, perfect, regular or irregular. Sepals distinct or united into a calyptra, caducous, 2, rarely 3 or 4. Petals 4-6 or rarely none, imbricated, deciduous. Stamens numerous or few, hypogynous, distinct; filaments filiform; anthers opening by a longitudinal slit. Ovary 1, many-ovuled, mostly 1-celled, the carpels rarely becoming distinct in fruit; style short; stigma simple or divided; ovules anatropous. Fruit a capsule, generally dehiscent by pores or valves.

Flowers regular.

Uppermost leaves opposite.

Filaments very broad; carpels distinct in fruit.

1. PLATYSTEMON.

Filaments filiform or nearly so; capsule 1-celled.

2. MECONELLA.

Leaves all alternate.

Flowers large, white.

Perennial; capsule many-celled.

3. ROMNEYA.

Annual; capsule 1-celled.

7. ARGEMONE.

Flowers not white.

Flowers yellow or orange.

Shrub; flowers yellow.

4. DENDROMECON.

Herbs; flowers usually orange.

5. ESCHSCHOLZIA.

Flowers reddish.

Stigmas tufted at the end of the short style.

6. MECONOPSIS.

Stigmas sessile, radiate.

8. PAPAVER.

Flowers irregular.

9. BICUCULLA.

1. **PLATYSTEMON** Benth. CREAM CUP.

Low villous annuals with entire mainly opposite leaves and cream-colored flowers. Sepals 3. Petals 6. Stamens many, with flattened filaments and linear anthers. Carpels 6-25, at first united; stigmas linear, free. Fruit of as many distinct linear indehiscent torulose pods, 3-8-seeded, at length breaking transversely between the seeds.

1. **P. californicum** Benth. Slender, branching from the base, more or less decumbent, 15-30 cm. high, pilose; leaves 5-8 cm. long, sessile or clasping, broadly linear; peduncles erect, 8-20 cm. long; sepals villous; petals 6-12 mm. long, cream-yellow, sometimes shading to yellow toward the base; carpels 6-25, forming an oblong head, 10-20 mm. long, beaked by the persistent stigmas.

Common in sandy soil throughout our range below 3000 feet altitude. March-May.

2. **MECONELLA** Nutt.

Low slender annuals with leaves, sepals and petals as in *Platystemon*. Stamens 6-12; filaments filiform or nearly so. Ovary 1-celled with 3 parietal placentæ, somewhat 3-lobed or nearly terete; stigmas ovate to subulate. Capsule 3-valved, dehiscent through the placentæ.

1. **M. denticulata** Greene. Glabrous, branching, 8-25 cm. high; lower leaves spatulate or the small blade rhombic-ovate and narrowed into a broad petiole, 1-3 cm. long; upper spatulate or linear-oblong, entire or denticulate; petals narrow, oblong, 2-4 mm. long; stamens 6-9; anthers linear, equaling or exceeding the filaments. (*Platystigma denticulatum* Greene.)

Occasional in shady places in the foothills. March-May.

3. **ROMNEYA** Harv. MATILJA POPPY.

Smooth stout erect perennial half woody plants, with colorless juice, pinnately divided alternate leaves and very large showy flowers. Sepals 3, with a broad membranaceous dorsal wing. Petals 6. Stamens numerous, with filiform filaments somewhat thickened below, and oblong anthers. Ovary oblong, densely setose, more or less completely several-celled by the intrusion of the many-ovuled placentæ; valves 7-12, opening from the summit downward. Seeds finely tuberculate.

1. **R. coulteri** Harv. Herbaceous stem 1-2.5 m. high, from a soft woody base, branching above, glabrous glaucescent; leaves of

firm texture, pinnately parted or divided, petioled, 6-12 cm. long; divisions 3-9, cuneate-oblong or lanceolate, dentate, the terminal 3-cleft, margins and rachis often sparsely ciliolate-spinulose; flowers terminating the branches; sepals smooth, beaked; petals delicate, 4-6 cm. long.

Occasional in canyons. Santa Ana Mountains; Puente Hills. It also occurs in Ventura County.

2. *R. trichocalyx* Eastwood. Closely resembling the last in habit, leaves thinner, divisions narrower; sepals setose, beakless or nearly so.

In canyons near Corona also in San Diego, Santa Barbara and Ventura Counties.

4. *DENDROMECON* Benth. BUSH POPPY.

Smooth branching shrubs with alternate vertical thick rigid entire or ciliolate-denticulate leaves, and showy yellow flowers. Sepals 2. Petals 4. Stamens numerous, with short filiform filaments and linear anthers. Ovary linear, 1-celled and with 2 nerve-like placentæ, elastically 2-valved from the base upward; valves striate-costate. Seeds oval or globose, finely pitted, carunculate at the hilum.

1. *D. rigidum* Benth. Shrub 1-3 m. high, with many slender branches and light-colored bark; leaves pale or glaucescent, lanceolate and cuspidate-acuminate, varying to oblong and obtuse with rigid mucro, entire or rarely ciliolate-denticulate, reticulate-veiny with strong midrib, short-petioled, 2-6 cm. long; flowers bright yellow, 2-4 cm. broad; capsule arcuate, 4-6 cm. long.

Frequent in the chaparral belt. Flowering nearly throughout the year.

5. *ESCHSCHOLZIA* Cham. CALIFORNIA POPPY.

Smooth glaucous annual or perennial herbs, with colorless bitter juice, finely dissected leaves and bright orange or yellow flowers. Sepals coherent into a narrow pointed hood, deciduous at anthesis from a dilated torus. Petals 4, borne on the torus. Stamens numerous, with short filaments and linear anthers. Ovary linear, with 2 nerve-like placentæ; styles short; stigmas divided into 4-6 linear unequally divergent lobes. Capsule elongated, 10-nerved, 1-celled, dehiscent by 2 valves separating from placental ribs. Seeds globose, reticulate or rough tuberculate.

Perennial with a stout branching root.

Annual with a simple tap-root.

Stems smooth and glabrous.

Stems pubescent below; scabrous or hirsute above,

1. *E. californica*.

2. *E. peninsularis*.

3. *E. hypocoides*.

1. *E. californica* Cham. Root perennial, thick and branching; stems branching, decumbent or ascending, leafy; herbage glabrous; calyx about 2 cm. long, conical; petals flabelliform, 4 cm. long or less, usually orange, sometimes paler; rim of torus expanded, 2-4 mm. wide; seeds reticulated.

Not common within our limits. Sierra Madre; San Fernando Mountains near Chatsworth Park. March-May.

2. *E. peninsularis* Greene. Annual, smooth and rather glaucous; scapose or at length freely branching, 10-25 cm. high; petals golden yellow or orange, flabelliform or broadly cuneate, 4 cm. long or less; rim of torus expanded, 2-4 mm. broad; seeds reticulated.

Common in sandy soil throughout our range in the valleys. March-May.

3. *E. hypocoides* Benth. Scabrous or hirsute, pubescent below, glabrous above, glaucescent; branches many and rather slender from an annual root, decumbent at base, about 30 cm. high or less, leafy; leaf segments few, linear-cuneiform; calyx oblong-conic, 1 cm. long; petals 2 cm. long or less, orange; torus short, tubular or turbinate, without expanded rim to the outer margin, the inner erect, hyaline; seeds faintly reticulated.

Santa Monica Mountains, not common.

6. MECONOPSIS Vigner.

Ours slender erect leafy annuals, with orange-colored juice and scarlet or orange-red flowers. Sepals 2. Petals 4. Stamens numerous. Ovary and capsule tipped with a style and with a globose mass of stigmas, 1-celled and with 4-8 more or less intruded placentæ, dehiscent by only as many short teeth or valves at the summit.

1. *M. heterophylla* Benth. Glabrous or sparsely pilose-pubescent below, 3-6 dm. high, simple or branching; leaves somewhat succulent, pinnately parted or divided, mostly petioled; peduncles slender; petals 1-2 cm. long, brick-red; capsule turbinate to obovate, dehiscent by 8 operculate lids.

Frequent in shady places in the foothills and mountains below 4000 feet altitude. March-April.

7. ARGEMONE L.

Setose and spinulose-dentate chiefly annual herbs, with orange-yellow and acrid juice, and sinuate or pinatifid leaves. Sepals with cornute tip or appendage below the apex. Petals 4 or 6. Stamens numerous. Ovary densely setose, 1-celled, with 4-5 nerviform placentæ, stigmas oval, somewhat radiate and united on the summit of the very short obsolete style.

1. *A. platyceras hispida* (Gray) Prain. Stem erect, simple or rarely branching, 3-6 dm. high, hispid throughout and more or less armed with rigid bristles or prickles; leaves 6-10 cm. long, the lower narrowed to a winged petiole, the upper sessile; flowers white, 5-8 cm. broad; capsule oblong, 3 cm. long, very prickly; seeds 2 mm. in diameter.

Occasional in dry exposed slopes or dry canyon floors in all the mountains. June-August.

8. PAPAVER L.

Annual or perennial herbs with narcotic juice milky or rarely turning yellow, mostly pinnately lobed or dissected leaves and showy flowers solitary on long peduncles. Sepals 2. Petals 4. Stamens numerous. Ovary capped by the closely sessile circular flat or somewhat conical disk of the combined radiate stigmas, dehiscent only under the edge of it by as many dentiform short lids; placentæ 4-20, mostly projecting far into the cell.

1. *P. californicum* Gray. Annual, erect, simple or branching, 3-6 dm. high, sparsely pilose-pubescent, leafy below; petals brick-red with greenish spot at base, 2 cm. long or less; capsule 1 cm. long or more, clavate-turbinate, 6-11-nerved.

Frequent on shady slopes in the Santa Monica and San Gabriel Mountains. March-May.

9. BICUCULLA Adans.

Perennial glabrous herbs, with compound and much-dissected leaves and more or less irregular flowers. Sepals 2, small and scale-like. Petals 4 in 2 pairs; the outer pair with more or less spreading tips, spurred or saccate at base; inner pair narrower, callous tipped, cohering over the enclosed stigma. Stamens 6, in 2 sets of 3 each; anthers of middle stamens 2-celled, the others 1-celled; filaments slightly united or distinct. Ovary 1-celled with 2 parietal several-ovuled placentæ; stigma 2-lobed contrary to the placentæ. Fruit a silique-form capsule.

1. *B. chrysantha* (H. & A.) Coville. Pale and glaucous; stem erect, 6-15 dm. high; leaves twice pinnate, and the more or less confluent divisions pinnately 3-5-cleft or incised; inflorescence compound thyrsoid-paniculate, many-flowered; flowers yellow, erect, subterete, 1-15 dm. long, deciduous; outer petals soon spreading or recurving to below the middle, slightly gibbous at base, but little larger than the inner; these dorsally crested with a long and wide undulate or crisped wing. (*Dicentra chrysantha* H. & A.)

Frequent in the chaparral belt throughout our range. May-July.

2. *B. ochroleuca* (Engelm.) Heller. Much like the last in habit, but the flowers 2–2.5 cm. long, ochroleucous; only the tips of the outer petals spreading; the inner with purple tips and with large wing crest. (*Dicentra ochroleuca* Engelm.)

Occasional on the northern slope of the Santa Monica Mountains.

Family 38. BRASSICACEAE. MUSTARD FAMILY.

Herbs or rarely suffrutescent plants, with acrid juice, alternate leaves and racemose or corymbose flowers. Sepals 4, deciduous or persistent, the 2 outer narrow, the inner similar, concave or saccate at base. Petals 4, rarely 2 or none, hypogynous, cruciate, nearly equal, generally clawed. Stamens 6, rarely fewer, hypogynous tetradynamous. Pistil 1, compound, consisting of 2 united carpels, the parietal placentæ united by a dissepiment; style generally persistent, sometimes none; stigma discoid or more or less 2-lobed. Fruit a silique or silicle, usually 2-celled, 2-valved or rarely indehiscent. Endosperm none; cotyledons incumbent, accumbent or conduplicate. (*Cruciferae*.)

* *Pods dehiscent into 2 valves to the base.*

a. Pods elongated-linear, at least twice as long as wide.

Flowers white or purplish.

Subaquatic or marsh plants.

Seeds in 1 row in each cell.

Seeds in 2 rows in each cell.

Not aquatic or marsh plants.

Rootstocks tuberous.

Roots fibrous.

Petals flat.

Pods usually compressed, seeds flat, winged.

Pods terete; seeds oblong or globose, wingless.

Petals undulate-crisped or twisted.

Pods terete or nearly so; cotyledons incumbent.

Pods compressed; cotyledons accumbent.

Flowers yellow.

Pods borne on a long stipe.

Pods sessile or short stipitate.

13. CARDAMINE.

11. SISYMBRIUM.

14. DENTARIA.

23. ARABIS.

2. THELYPODIUM.

3. CAULANTHUS.

4. STREPTANTHUS.

1. STANLEYA.

- Pods terete or 4-angled, sessile or short stipitate.
 Pubescence simple or none.
 Pods spreading.
 Seeds globose or oblong.
 Seeds in 2 rows.
 Flowers small. 12. RADICULA.
 Flowers about 1 cm. broad. 7. DILOTAXIS.
 Seeds in 1 row. 8. BRASSICA.
 Seeds flat. 10. BARBAREA.
 Pods erect, appressed to the stem. 6. ERYSIUM.
 Pubescence branched or stellate.
 Leaves entire or faintly toothed. 24. CHEIRANTHUS.
 Leaves deeply 2-pinnatifid. 22. SOPHIA.
 Pods flat. 15. TROPIDOCARPUM.

b. Pods short, never twice as long as broad except in *Draba*.

Pods compressed parallel with the partition.

Pods many-seeded. 19. DRABA.

Pods 2-seeded. 25. KONIGA.

Pods compressed contrary to the partition.

Pods many-seeded.

Pods heart-shaped. 18. BURSA.

Pods elliptic. 17. HUTCHINSIA.

Pods 2-seeded. 5. LEPIDIUM.

** *Pods indehiscent.*

Pods orbicular or nearly so, not elongated.

Pods of 2 indehiscent cells. 16. DITHYREA.

Pods 1-celled, 1-seeded, orbicular.

Pods winged. 21. THYSANOCARPUS.

Pods wingless. 20. ATHYSANUS.

Pods elongated jointed. 9. RAPHANUS.

1. STANLEYA Nutt.

Mostly tall erect branching glabrous and glaucous perennial herbs, with entire toothed or pinnately divided leaves and large yellow bractless flowers in elongated terminal racemes. Sepals linear, narrow. Petals narrow, long-clawed. Stamens 6, nearly equal; anthers twisted. Ovary short, stipitate; style short or none. Siliques linear, long-stipitate, spreading or recurving, somewhat compressed, dehiscent; the valves strongly 1-nerved. Seeds in 1 row in each cell. Cotyledons straight.

1. *S. pinnata* (Pursh) Britton. Stems stout, 15–25 dm. high; lower leaves pinnatifid or pinnately divided or rarely entire, 12–20

cm. long, 2-8 cm. wide, long-petioled; upper leaves similar or less divided or oblong-lanceolate and entire, short-petioled; flowers numerous, yellow; petals 16-24 mm. long; filaments filiform, exserted; siliques 5-8 cm. long, on stipes about $\frac{1}{2}$ as long.

Occasional on the dry plains and foothills of all interior valleys.

2. THELYPODIUM Endl.

Erect annual or biennial herbs, glabrous or somewhat pubescent with simple hairs. Leaves entire, toothed or pinnatifid. Flowers racemose or subspicate, purplish or whitish. Siliques nearly terete, linear, short-stipitate or sessile; valves 1-nerved, dehiscent; style short; stigma nearly entire. Seeds in 1 row in each cell, oblong, marginless. Cotyledons incumbent.

1. *T. lasiophyllum* Greene. Erect annual, simple or sparingly branched above the middle, hispid below, often smoothish above; leaves oblanceolate in outline, irregularly sinuate-toothed or pinnatifid with spreading acute entire or toothed segments, 4-12 cm. long, distinctly petioled or the upper sessile by a narrow base; inflorescence racemose; sepals oblong, $\frac{1}{2}$ as long as the petals; these narrow, spatulate, 3-5 mm. long, pale rose color or yellowish-white; siliques usually deflexed or widely spreading, slender attenuate, 3-5 cm. long, on pedicels 2-3 mm. long. (*Sisymbrium reflexum* Nutt.)

Common in dry ground both in the valleys and foothills.

2. *T. lasiophyllum inalienum* Robinson. Size and habit of the type; petals yellow or yellowish; siliques erect or slightly spreading. (*Sisymbrium acutangulum* Brew. & Wats.)

Hills about Los Angeles.

3. CAULANTHUS Watson.

Stout erect biennials, with pinnatifid, toothed or nearly entire leaves and purple or greenish-white flowers. Sepals about equal, saccate at base. Petals slightly longer, undulate-crisped, claw broad, blade rhomboidal, scarcely broader than claw. Anthers linear, sagittate at base, curved. Stigma somewhat 2-lobed, the lobes parallel with the valves. Pods terete, elongated, sessile upon the receptacle; valves 1-nerved. Seeds in 1 row, oblong, somewhat flattened, scarcely or not at all margined. Cotyledons incumbent.

1. *C. amplexicaulis* Wats. Glaucous annual, rather slender and flexuous, simple or more frequently with several spreading branches; leaves elliptic-oblong or the upper broadly cordate-clasping, subentire, often ascending; pedicels 8-24 mm. long, widely spreading.

Near San Fernando, *Davidson*.

4. **STREPTANTHUS** Nutt.

Erect branching often glaucous annual or biennial herbs, with entire or toothed rarely pinnatifid leaves and purple or white flowers. Sepals ovate or oblong, equal at base or 1 or rarely both pair saccate at base, usually colored, their tips erect or spreading. Petals narrow or with a well developed blade and channeled claw, twisted or undulate. The longer filaments sometimes connate; anthers elongated, sagittate at base. Pod linear, compressed; valves 1-nerved. Seeds in 1 row, flattened and more or less winged. Cotyledons accumbent.

1. **S. heterophyllus** Nutt. More or less pubescent throughout with spreading simple hairs; stem usually simple, 1 m. high or less; leaves linear, at least the lowest pinnatifid with divaricate lobes or toothed, the upper usually entire; flowers purplish or white, 8-12 mm. long; calyx narrow; sepals slightly saccate; pods abruptly reflexed on slender pedicels 5-7 cm. long, about 1.5 mm. wide, beaked by a slender style; seeds small and crowded, narrowly winged.

Occasional throughout our range; confined mostly to the chaparral belt. April-May.

5. **LEPIDIDIUM** L. PEPPERGRASS.

Erect or diffuse, glabrous or pubescent, annual or rarely biennial or perennial herbs, with pinnatifid, lobed or entire leaves and racemose white or whitish flowers. Petals small or rarely wanting. Stamens often fewer than 6. Stigmas, in ours, sessile or nearly so. Silicles oblong or obovate, flattened contrary to the partition, more or less emarginately winged at the apex; valves keeled, dehiscent. Seeds 1 in each cell, flattened. Cotyledons incumbent or rarely accumbent.

Capsule merely emarginate.

Pedicels terete.

1. *L. medium*.

Pedicels flattened.

Stems spreading or decumbent, hirsute.

2. *L. lasiocarpum*.

Stems erect, glabrate or sparsely pubescent.

3. *L. nitidum*.

Capsule with 2 distinct apical teeth.

4. *L. acutidens*.

1. **L. medium** Greene. Glabrous or nearly so; stems simple below, branching above, erect, 2-9 cm. high; leaves lanceolate, dentate, rarely pinnatifid; stem leaves entire; pedicels slender, terete, spreading or divaricate, longer than the capsule; stamens 2-4; capsule orbicular, retuse, glabrous.

Common in the valleys and mountains throughout our range.

2. *L. lasiocarpum* Nutt. Low, branching from or near the base, decumbent or ascending, hirsute with spreading hairs or somewhat tomentulose; lower leaves pinnately parted, segments usually rather broad, obtuse or rounded, sparingly toothed or entire; racemes several; pedicels distinctly flattened, horizontally spreading, 3 mm. long; capsule suborbicular, thin-margined near the apex, hispid pubescent upon both faces or at least upon the margins.

Sand-dunes along the seashore.

3. *L. nitidum* Nutt. Erect or usually branched from the base and spreading, 1–3 dm. high, glabrate or somewhat pubescent; lower leaves deeply pinnatifid with narrow rachis and alternate segments; the upper leaves often entire; racemes 1–several, loosely flowered; petals considerably exceeding the sepals; pedicels strongly flattened, spreading; capsule smooth, shining, often purplish, 4–5 mm. long.

Very common on grassy plains and hills. February–March.

4. *L. acutidens* (Gray) Howell. Branching from the base, decumbent or ascending, 10–20 cm. long, pubescent throughout with short spreading hairs; leaves linear, tapering at both ends, entire or faintly and remotely denticulate, 2–5 cm. long, about 2 mm. wide; branches flowering about $\frac{2}{3}$ their length; racemes rather loose; pedicels strongly flattened, appressed to the stem to near the middle, then curving outward; pot strongly reticulated, sparsely pubescent, 4 mm. long including the acute teeth, about 3 mm. broad; sinus about 1 mm. deep and 2 mm. broad at tip. (*L. dictyotum acutidens* Gray.)

In saline places toward the coast. Cienega; Santa Monica.

6. ERYSIMUM L. HEDGE-MUSTARD.

Erect annual, somewhat hirsute at least below with simple hairs. Leaves pinnatifid. Inflorescence spiciform with several divaricately spreading branches. Flowers small, yellow. Siliques terete, tapering almost from the base to the apex; stigma slightly 2-lobed. Seeds in 1 row in each cell. A monotypic genus as here understood.

1. *E. officinale* L. Stems 3–6 dm. high; basal leaves lyrate and somewhat runcinately pinnatifid, 7–15 cm. long, the upper shorter, lanceolate, subentire or hastate; pods 1 cm. long, nearly sessile, erect and closely appressed to the rachis. (*Sisymbrium officinale* Scop.)

Common along streets and in waste places. Native of Europe.

7. DIPLLOTAXIS DC. SAND ROCKET.

Erect annual or perennial herbs with pinnatifid or lobed leaves and rather large yellow flowers in terminal racemes. Silique elongated linear, flat or flattish, short

beaked or beakless; valves mostly 1-nerved. Style slender. Seeds in 2 rows in each cell, marginless. Cotyledons conduplicate.

1. *D. tenuifolia* (L.) DC. Annual, branched from the base, sparingly hispid or glabrous, the slender branches 3–6 dm. high, leafy only below; leaves oblanceolate, sinuate-lobed or sometimes pinnatifid, 5–10 cm. long, narrowed at the base, mostly slender-petioled; fruiting racemes long, loose; flowers 12–16 mm. broad; pod about 3 cm. long, 2 mm. wide, erect, flattish; fruiting pedicel 18–30 mm. long.

Occasional along ditches about Los Angeles, Pasadena and Santa Ana. Native of Europe.

8. *BRASSICA* L. MUSTARD.

Erect branching annual or biennial herbs, with pinnatifid basal leaves, those of the stem dentate or often nearly entire, and showy yellow flowers in elongated racemes. Siliques elongated, sessile on the receptacle, terete or 4-angled, tipped with a persistent usually 1-seeded beak; valves 1–3-nerved; stigma truncate or 2-lobed. Seeds in 1 row in each cell, globose. Cotyledons conduplicate.

Pods erect and appressed to the stem.

1. *B. nigra*.

Pods spreading.

Leaves not clasping; pods pubescent.

2. *B. alba*.

Upper leaves clasping; pods glabrous.

3. *B. campestris*.

1. *B. nigra* (L.) Koch. Erect, 1–3 m. high, freely and widely branching, pubescent or glabrate; lower leaves slender-petioled, deeply pinnatifid, with 1 terminal large lobe and 2–4 smaller lateral ones; segments all dentate; upper leaves short-petioled or sessile, pinnatifid or dentate or the uppermost entire; flowers 6–10 mm. broad; pedicels slender, 4 mm. long in fruit; pods narrowly linear, 4-angled, smooth, 10–15 mm. long, 1 mm. wide, appressed against the stem; beak slender, 2–4 mm. long; seeds dark brown.

Common in poorly cultivated fields, especially in adobe soils. April–May.

2. *B. alba* (L.) Boiss. Erect, branching above, 3–10 dm. high, more or less pubescent with simple hairs; leaves all pinnatifid or the upper only dentate; pods spreading, pubescent, tipped with a flattened beak of about equal length; seeds pale yellow.

Near the Soldiers' Home, *Hasse*.

3. *B. campestris* L. Stems 3–10 dm. high, glabrous and glaucous or rarely slightly pubescent below; lower leaves petioled, pubescent, more or less lobed or pinnatifid, the upper glabrous, lanceolate or oblong, acute or obtusish, sessile and clasping at the base, entire

or dentate; pedicels spreading or ascending, often 2 cm. long in fruit; pods 3–5 cm. long; beak 8–10 mm. long.

Frequent in waysides and neglected gardens. January–April. In favored places often flowering nearly throughout the year.

9. *RAPHANUS* L. RADISH.

Erect or widely branching from the base, annual or biennial herbs, with lyrate leaves and showy flowers. Silique elongated linear, fleshy or corky, constricted or continuous and spongy between the seeds, indehiscent. Seeds globose. Cotyledons conduplicate.

1. *R. sativus* L. Biennial or annual from a more or less elongated fleshy root; erect and freely branching, 3–5 dm. high, sparsely pubescent with stiff hairs or nearly glabrous above; lower leaves deeply lyrate-pinnatifid; segments crenate or dentate; flowers 12–18 mm. broad, yellowish or commonly whitish with purple veins; pods 2–4 cm. long, constricted between the seeds when mature; seeds 2–several; beak conical, 1–2 cm. long.

Frequent in poorly cultivated fields and waste places, especially in sandy soils. April–June or often throughout the year.

10. *BARBAREA* R. Br.

Erect glabrous biennial or perennial branching herbs with angled stems, pinnatifid leaves and racemose yellow flowers. Silique elongated linear, 4-angled; valves keeled or ribbed; style short; stigma 2-lobed or capitate. Seeds in 1 row in each cell, flat, oblong, marginless. Cotyledons accumbent.

1. *B. barbarea* (L.) MacM. Tufted stems erect, 3–6 dm. high; lower leaves petioled, 5–12 cm. long, lyrate-pinnatifid, segments oval or obovate, repand-toothed or sometimes entire; upper leaves sessile, rarely clasping; flowers yellow, 6–8 mm. broad; pods spreading or ascending, about 2 cm. long, obscurely 4-angled; pedicels about 4 mm. long. (*B. vulgaris* R. Br.)

Moist places in the mountains, confined mostly to the pine belt. June–August.

11. *SISYMBRIUM* L.

An aquatic or uliginous herb, with pinnately divided leaves, and small white flowers in terminal racemes. Pods linear to linear-oblong, slender pedicelled, tipped with the rather stout style, the valves nerveless. Seeds in 2 rows in each cell. Cotyledons accumbent.

1. *S. nasturtium-aquaticum* L. (WATERCRESS.) Aquatic, glabrous; stems branching, floating or creeping, rooting from the nodes; leaves odd-pinnate; leaflets 3–11, roundish or oblong, nearly

entire; racemes elongated in fruit; flowers white, 4–5 mm. broad; petals twice the length of the sepals; pods 1–3 cm. long, 2 mm. wide, spreading and slightly curved upward, on pedicels of about their own length. (*Nasturtium officinale* R. Br.)

Common in streams. May–October.

12. RADICULA Hill.

Branching herbs with simple or pinnate-lobed, dissected or rarely entire leaves and small yellow flowers. Sepals spreading. Stamens often less than 6. Pods short, terete or nearly so, sessile on the receptacle; valves faintly 1-nerved or nerveless. Styles short or slender. Seeds turgid, minute, in 2 rows in each cell. Cotyledons accumbent.

1. *R. curvisiliqua* (Hook.) Greene. Annual or biennial, sparingly pubescent or glabrous, with erect or ascending, usually much branched stems, 15–45 cm. high; leaves mostly oblanceolate in outline, pinnatifid, pinnately lobed or toothed, the lower 25–75 mm. long; racemes short; flowers pale yellow, 4 mm. broad; petals slightly exceeding the sepals; style short; pods linear, 8–15 mm. long, about 1.5 mm. wide, strongly curved upward; pedicels spreading or ascending.

Frequent in low ground, about ponds and on river bottoms. Variable in foliage characters.

13. CARDAMINE L.

Erect or ascending herbs mostly growing in marshes or along watercourses, with running rootstocks or fibrous roots, entire, lobed or divided leaves and racemose or corymbose, white or purple flowers. Stamens usually 6. Siliques elongated, flat, generally erect; valves nerveless, elastically dehiscent at maturity, sessile on the receptacle. Seeds in 1 row in each cell, compressed, marginless. Cotyledons accumbent, equal or unequal.

1. *C. gambellii* Wats. Rather stout, 6–9 dm. high, branched, decumbent at base and rooting at the lower joints, glabrous or sparingly soft villous; leaves mostly basal, persisting in a rosulate cluster, pinnately divided; leaflets 4–6 pairs, ovate to oblong-linear, usually cuneate at base and acute, mostly few-toothed, 6–24 mm. long; raceme nearly sessile, becoming elongated; flowers white, 6–8 mm. broad; pedicels slender, divaricate; pods about the same length, narrow, erect or ascending, often curved; style slender, 2 mm. long.

Frequent in marshes and wet places in the valleys.

14. **DENTARIA** L.

Perennial herbs growing in damp woods, with fleshy tuberous rootstocks, erect mostly unbranched stems and more or less divided leaves. Flowers large, white or often tinged with purple. Petals much longer than the sepals with slender claw and ovate spreading blades. Siliques linear, flattened, their valves nerveless. Seeds in 1 row in each cell, wingless. Cotyledons thick, often unequal, accumbent.

1. **D. californica** Nutt. Rootstock slender, tubers small; stem 2-3 dm. high, rather stout, simple or branched above, glabrous or nearly so; basal leaves entire or 3-foliate, the leaflets petiolulate, suborbicular, sinuate or coarsely toothed; cauline 2-4, mostly shortly petioled and above the middle of the stem, deeply lobed or pinnately 3-5-foliate, rarely simple, the leaflets mostly petiolate, ovate to lanceolate-linear, entire or toothed, 2-7 cm. long; flowers white or rose-colored; pods 2-6 cm. long; style 4-6 mm. long; seeds oblong.

Frequent in damp shady places in the mountains and foothills. March-April.

15. **TROPIDOCARPUM** Hook.

Slender erect branching annuals, more or less hirsute-pubescent with simple hairs or with a few forked ones intermingling. Leaves pinnatifid. Flowers yellow, borne in loose leafy-bracted racemes. Sepals concave, spreading, equal at base. Petals spatulate-obovate. Stamens tetradynamous; anthers short, rounded. Stigma circular or slightly emarginate, on a slender style. Silique partially or completely 2-celled, ours obcompressed, sometimes twisted.

1. **T. gracile** Hook. Stems slender, erect or spreading, usually 15-25 cm. long, more or less pubescent; leaves shallowly or deeply pinnatifid, the segments acutish, cleft or entire; cauline leaves reduced; pedicels axillary, spreading, 6-20 mm. long; pods lance-linear to linear, 1-2 cm. long, strongly obcompressed throughout; seeds in 2 rows in each cell.

Frequent in interior valleys. March-May.

2. **T. dubium** Davidson. Much resembling the last in habit, foliage and pubescence; capsule linear, 2-celled and strongly obcompressed above the middle, by a twist becoming compressed below and only 1-celled.

Frequent about Los Angeles. March-May.

16. **DITHYREA** Harv.

Low branching annuals, with stout stems and thickish ovate or orbicular subentire leaves, the whole herbage

more or less cinereous-tomentose with stellate hairs. Inflorescence racemose, dense, often branched. Flowers whitish or purple. Sepals ovate to oblong, erect or spreading, pubescent. Petals conspicuous with spreading blade and slender claw. Stamens 6 with linear sagittate anthers. Pods strongly obcompressed, 2-celled; the cells nearly orbicular, indehiscent with a thickened margin, separating at maturity from the persistent linear axis, 1-seeded. Seeds flat, marginless. Cotyledons accumbent.

1. **D. californica maritima** Davidson. Branching from the base, 15–30 cm. high; leaves thick, fleshy, densely pubescent, the basal narrowed to slender petioles, the upper sessile, coarsely toothed or subentire; racemes short, very dense, elongated in fruit; flowers about 12–15 mm. broad; limb purplish; pedicels dark purple; pods 8–10 mm. wide, half as long, emarginate above and below, pubescent on the margins.

Occasional along the seashore between Redondo and Playa del Rey.

17. HUTCHINSIA R. Br.

Low slender mostly diffuse herbs, more or less pubescent with forked hairs, ours annual with entire or pinnately lobed leaves and minute white flowers in terminal racemes. Stamens 6. Style none or very short. Siliques oval, obcompressed, the valves strongly 1-nerved. Seeds numerous in each cell. Cotyledons incumbent or accumbent.

1. **H. procumbens** (L.) Desv. Branching from the base, slender, ascending or procumbent, 5–20 cm. long; lower leaves short-petioled, pinnatifid, lobed, dentate or sometimes entire, 1–2.5 cm. long; upper leaves sessile or nearly so, entire or lobed; pedicels slender, ascending or spreading, 6–12 mm. long in fruit; pods elliptic or oval, obtuse, rarely emarginate, 3–4 mm. long. (*Capsella divaricata* Walp.; *C. elliptica* Meyer.)

In moist saline places throughout our range. March–April.

18. BURSA Weber. SHEPHERD'S PURSE.

Erect annual herbs, pubescent with forked hairs. Basal leaves tufted. Flowers racemose, small, white. Siliques cuneate-obcordate, obcompressed, the valves keeled. Style short. Seeds numerous in each cell, marginless. Cotyledons accumbent.

1. **B. bursa-pastoris** (L.) Britton. Erect, branching, 15–40 cm. high, pubescent below, mostly glabrous above; basal leaves lobed or

pinnatifid, forming a rosette, 5-12 cm. long; cauline leaves few, lanceolate, auricled, dentate or entire; flowers 2 mm. broad; pedicels slender, spreading or ascending, 10-14 mm. long in fruit; pods triangular, more or less deeply emarginate at the apex, rarely truncate, 4-6 mm. long. (*Capsella bursa-pastoris* Medic.)

Common weed in gardens and waste places. Flowering at all times of the year.

19. DRABA L.

Low tufted mostly stellate-pubescent herbs, with scape or leafy stems, simple leaves and racemose flowers. Silicles elliptic, oblong or rarely linear, compressed. Stigma entire or nearly so. Valves dehiscent, nerveless. Cotyledons accumbent.

1. *D. cuneifolia* Nutt. Annual, loosely stellate-pubescent throughout, branching from the base, the branches slender, 8-15 cm. long, leafy below; leaves obovate to oblanceolate, acute or acutish, entire or few-toothed, 1-5 cm. long; raceme pedunculate, a-length elongated, loosely flowered; flowers small, white; pods lineart oblong, 6-10 mm. long, many-seeded, hispid with appressed simple hairs; fruiting pedicels divaricate, 2-6 mm. long; stigma sessile or nearly so.

Occasional in dry sandy soil in the foothills and the interior valleys. The two varieties are more common.

1a. *D. cuneifolia integrifolia* Wats. Smaller than the type, 2-5 cm. high; leaves smaller, mostly entire; capsule glabrous; pedicels 2 mm. long or less.

Same range as the type and apparently more common.

1b. *D. cuneifolia sonorae* (Greene) Parish. Much resembling the type in size and habit; racemes often nearly sessile; capsules hispid with stellate hairs.

Same range as the type and the most common form with us.

20. ATHYSANUS Greene.

Slender diffuse annual, leafy only near the base. Leaves simple, toothed. Sepals equal. Petals without claws. Stamens 6, equal. Silicles orbicular, not winged or margined, 1-celled and 1-ovuled.

1. *A. pusillus* (Hook.) Greene. Hirsute-pubescent; stems filiform, branching from the base, the branches mostly ascending, unilaterally racemose throughout; leaves few, ovate, sparingly toothed, 1 cm. long; flowers minute, often apetalous; pods lenticular, more or less uncinat hispid, 2 mm. long or less.

Frequent in the chaparral belt throughout our range. March-May.

21. THYSANOCARPUS Hook. LACE POD.

Erect and slender, sparingly branched annuals with minute white or rose-colored flowers in slender elongated

racemes. Stamens 6, tetradynamous or rarely only 4. Capsule compressed, orbicular, 1-celled, 1-ovuled, indehiscent, winged; the wings entire crenate or perforated.

1. *T. curvipes* Hook. More or less hirsute, 2 dm. high or more, branching above; basal leaves rosulate, oblong, pinnatifid with short blunt lobes or dentate; upper leaves lanceolate, sagittate-auriculate, clasping at base, 1-2 cm. long; pedicels very slender, 3-6 mm. long, strongly recurved; capsule usually pubescent; wings entire or crenate.

Frequent on grassy slopes. March-April.

2. *T. laciniatus* Nutt. Smooth or nearly so, and somewhat glaucous, 2-4 dm. high; leaves rather thin, the basal ones not forming a rosette, linear, entire to deeply pinnatifid into narrow linear segments, upper leaves entire, 20-25 mm. long, 2-4 mm. wide, narrowed at base, racemes 10-20 cm. long; pods elliptic to orbicular, 3-3.5 mm. in diameter, including the entire or slightly crenate wing, reticulate, glabrous or sometimes somewhat pubescent; pedicels slender, spreading and becoming more or less deflexed.

Occasional on shaded slopes in the canyons of the Santa Monica, San Gabriel and Santa Ana Mountains, mostly below 3000 feet altitude.

22. SOPHIA Adans.

Annual or perennial herbs, canescent or pubescent with short forked hairs, with slender branching stems, 2-pinnatifid or finely dissected leaves and small yellow flowers in terminal racemes, these becoming elongated in fruit. Calyx early deciduous. Style very short. Siliques linear or linear-oblong, slender-pedicelled, the valves 1-nerved. Seeds minute, oblong, wingless, in 1 or 2 rows in each cell. Cotyledons incumbent.

1. *S. pinnata* (Walt.) Howell. Densely canescent throughout, pale; stem erect, branched, 2-7 dm. high, slender, the branches ascending; leaves 5-10 cm. long, oblong, 2-pinnatifid into very numerous small, toothed or entire, obtuse segments; pedicels very slender, widely spreading, 10-15 mm. long; pods horizontal or ascending, oblong or linear-oblong, somewhat compressed, 6-8 mm. long, 2 mm. wide, canescent or glabrous; seeds in 2 rows in each cell. (*Sisymbrium canescens* Nutt.)

Common in sandy soil in the foothills and valleys. April-June.

2. *S. incisa* (Engelm.) Greene. Glabrous or somewhat glandular-hairy, 3-6 dm. high, freely branching; leaves pinnately divided, the segments lanceolate or linear-lanceolate, incisely serrate; petals lanceolate-spatulate, surpassing the sepals; pedicels 4-6 mm. long, spreading, exceeded by the spreading or curved-ascending, nearly or quite glabrous capsule; seeds in 1 row in each cell.

Frequent in the pine belt of the San Bernardino Mountains, and to be expected within our range.

23. ARABIS L.

Annual or perennial, glabrous or pubescent herbs with entire lobed or pinnatifid leaves and white or purple flowers. Siliques linear, elongated, compressed, with smooth or keeled mostly 1-nerved valves, not elastic, dehiscent at maturity. Stigma nearly entire or 2-lobed. Seeds in 1 or 2 rows in each cell, flattened, winged or wingless. Cotyledons accumbent.

Leaves deeply pinnatifid, glabrate.

1. *A. virginica*.

Leaves sparingly toothed or entire.

Pubescent throughout.

2. *A. repanda*.

Pubescent only at base; cauline leaves glabrous and glaucous.

3. *A. glabra*.

1. *A. virginica* (L.) Trelease. Annual or rarely biennial, glabrate; stems ascending or decumbent, 1.5–3 dm. high; leaves oblong, narrow, deeply pinnatifid, 2.5–7 cm. long, the lower petioled, the upper nearly sessile; pedicels spreading or ascending, 4 mm. long in fruit; flowers very small, white; pods linear, ascending, 16–24 mm. long, about 2 mm. broad; seeds in 1 row in each cell, nearly as broad as the pod, orbicular, wing-margined. (*A. ludoviciana* C. A. Meyer.)

Inglewood in low ground. Our plants have the leaves often merely dentate. March.

2. *A. repanda* Wats. Biennial; stem stout, branching, 3 dm. high or more, pubescent throughout with mostly stellate hairs, usually longer and simple at base; leaves narrowly obovate to oblanceolate, 3–10 cm. long, sparingly toothed or nearly entire, those of the stem narrowed to a winged petiole, acute or obtuse; flowers white, small; petals narrow, 4 mm. long, slightly exceeding the calyx; pods recurved-spreading, faintly 1-nerved at the base, seeds elliptic, broadly winged.

Occasional in the upper portions of the pine belt in the San Gabriel and San Bernardino Mountains.

3. *A. glabra* (L.) Bernh. Biennial; erect, pubescent below, glabrous and glaucous above, simple or somewhat branched, 5–10 dm. high; basal leaves petioled, 5–15 cm. long, oblanceolate or oblong, dentate or sometimes lyrate, pubescent with simple hairs, those of the stem with sagittate base, glabrous, entire or the lower dentate, 5–10 cm. long, lanceolate or oblong, acutish; flowers yellowish white, 4 mm. broad; pedicels 4–10 mm. long, erect; pods narrowly linear, 5–7 cm. long, 1 mm. wide, erect and appressed; seeds in 2 rows in each cell, marginless; style none. (*A. perfoliata* Lam.)

Frequent in the foothills throughout our range.

24. CHEIRANTHUS L. WALLFLOWER.

Ours biennial or perennial more or less pubescent herbs, with simple entire or toothed leaves. Flowers mostly yellow. Siliques elongated, linear, 4-angled;

valves strongly keeled. Stigma lobed. Seeds oblong, in 1 row in each cell, marginless or narrowly margined at apex. Cotyledons incumbent. (*Erysimum*.)

1. *C. angustatus* Greene. Perennial; rather stout, erect, 5 dm. high or more; leaves narrowly linear-lanceolate, entire or few-toothed, few and scattered above, densely clothing the basal part of the herbaceous stem and short sterile branches of the short subligneous caudex, the whole plant subcinereous with appressed 2-forked hairs; calyx-lobes 10–12 mm. long; petals yellow, the lower pair parallel to each other, the upper divergent from each other; pods in a long lax raceme, 4-sided, ascending.

Occasional in the foothills of the Santa Monica and Santa Ana Mountains.

2. *C. suffrutescens* Abrams. Perennial; often much branched, the branches woody, 1 m. long or less, usually straggling among low shrubs, rough from the persistent bases of the old leaves, usually about 5 mm. thick; floral branches clustered at the ends of the main branches, slender, 3–4 dm. long; leaves scattered along the floral branches, densely clothing their bases, very narrowly linear-oblong, 2–3 mm. broad, entire or remotely and obscurely denticulate, these as well as the branches cinereous with appressed 2-forked hairs; calyx-lobes 6–7 mm. long; petals yellow, cruciform; pods in rather short but lax racemes, on pedicels about 8 mm. long, widely spreading, straight or slightly curved upwards, 4-sided, 1.5–1.75 mm. broad, 5–6 cm. long; beak slender, scarcely 1 mm. broad and but little longer; seeds brownish, about 1.5 mm. long.

Common on the sand-dunes along the seashore. Flowering nearly the year round.

25. KONIGA Adans. SWEET ALYSSUM.

Perennial herbs, pubescent or canescent with forked hairs, with entire leaves and small white flowers in terminal racemes. Petals obovate, entire. Filaments slender, with 2 small glands at the base. Capsule compressed, oval or orbicular. Seeds 1 in each cell. Cotyledons accumbent.

1. *K. maritima* (L.) R. Br. Ascending or sometimes procumbent, freely branching, 1–3 dm. high, minutely pubescent with appressed hairs; basal leaves oblanceolate, narrowed into a petiole; flowers white, fragrant, about 4 mm. broad; fruiting pedicels ascending, 6–8 mm. long; capsules glabrous, pointed, oval or nearly orbicular, 2–3 mm. long. (*Alyssum maritimum* L.)

An escape from gardens, along streets and in waste places. Flowering nearly throughout the year.

Family 39. CAPPARIDACEAE. CAPER FAMILY.

Herbs or rarely shrubs or trees with pungent or acrid watery juice, simple or palmately compound alternate leaves and axillary or terminal, solitary or racemose, mostly regular and perfect flowers. Sepals 4. Petals 4, sessile or clawed. Stamens usually 6, equal, inserted on the receptacle; anthers oblong, longitudinally dehiscent. Ovary sessile or stipitate, 1-celled; ovules many, borne on parietal placenta. Fruit a capsule or berry. Seeds mostly reniform; endosperm none; cotyledons somewhat coiled.

Herbs.
Shrubs.

1. CLEOME.
2. ISOMERIS.

1. CLEOME L.

Ours branching herbs with digitately 3-5-foliate leaves and yellow flowers in bracteolate racemes. Sepals 4, often persistent. Petals 4, cruciate, entire, equal. Stamens 6. Ovary stipitate with gland at the base. Capsule elongated, long-stipitate, many-seeded.

1. *C. lutea* Hook. Erect, glabrous, branching, 4-12 dm. high; leaves 5-foliate, slender-petioled or the upper 3-foliate and subsessile; leaflets oblong or oblong-oblancheolate, entire, short-stalked or sessile, narrowed at the base, obtuse or acute and mucronulate at the apex, 1-5 cm. long; bracts linear-oblong, mucronulate; flowers densely racemose; pedicels slender, 10-12 mm. long; pod linear, acute, 3-6 cm. long, borne on a stipe nearly as long.

Field near Downey, *Davidson*.

2. ISOMERIS Nutt.

Ill-scented shrubs with puberulent branches, 3-foliate petioled leaves and large yellow flowers axillary or in bracteate racemes. Sepals 4, persistent. Petals 4, oblong, equal. Receptacle dilated with a hemispherical torus. Stamens 6, inserted on the receptacle, enlarged and glandular on the upper surface. Ovary long-stipitate, many-ovuled on the placenta; style short; stigma minute. Capsule oval or nearly globose, inflated, tardily 2-valved. Seeds smooth.

1. *I. arborea* Nutt. Widely branching shrub, 1-3 m. high, with hard yellow wood and puberulent branches; leaves 3-foliate;

leaflets oblong to lanceolate, equaling the petioles, entire, mucronate; flowers in terminal bracteate racemes; bracts simple; petals yellow, 10–16 cm. long, twice longer than the sepals; capsule oblong, 2.5–3.5 cm. long, attenuate into the stipe and abruptly tapering at the apex.

Frequent on bluffs and hills along the coast, Playa del Rey; San Pedro; San Joaquin Hills; also at San Diego and in the desert regions.

Family 40. RESEDACEAE. MIGNONETTE FAMILY.

Annual or perennial herbs with alternate leaves, gland-like stipules and racemose or spicate bracted unsymmetrical flowers. Calyx 4–7-parted, more or less irregular. Petals 2–6, usually laciniate or dentate. Stamens hypogynous, 3–40, borne on the base of the calyx or on a dilated nectariferous and oblique disk, declined or unilateral. Ovary 1, composed of 3–6 carpels, at least the tips distinct; ovules many. Fruit capsular. Seeds reniform; endosperm none; cotyledons incumbent.

Petals 4; disk present.

1. RESEDA.

Petals 2; disk wanting.

2. OLIGOMERIS.

1. RESEDA L.

Erect or decumbent herbs with entire, lobed or pinatifid leaves and small spicate or narrowly racemose flowers. Petals 4–7, toothed or cleft. Disk cup-shaped, glandular. Stamens 8–30, inserted on the inner surface of the disk and on one side of the flower. Capsule 3–6-lobed, horned at the top before maturity.

1. *R. lutea* L. Ascending or decumbent, somewhat pubescent with short stiff hairs or nearly glabrous; leaves 5–10 cm. long, broadly ovate or oblong, deeply lobed or divided, sometimes pinatifid; segments linear-oblong with undulate margins; flowers in narrow racemes, 4–6 mm. broad, greenish yellow; pedicels ascending, about 4 mm. long in fruit; petals 6 or 5, all but the lowest irregularly cleft; sepals of the same number; capsule oblong, about 8 mm. long, with 3 or rarely 4 short teeth.

An occasional escape from gardens.



2. OLIGOMERIS.

Low glaucous chiefly annuals with linear and entire leaves, and small greenish flowers in terminal spikes.

Stamens usually 4. Petals 2, posterior, free or united at the base, entire or 2-3-lobed, persistent. Disk none. Stamens 3-10. Ovary 4-angled, 4-beaked. Capsule 4-sulcate, many-seeded, opening at the summit.

1. *O. glaucescens* Camb. Annual or biennial; 15-30 cm. high, branching at base, the branches ascending; leaves often fascicled and somewhat fleshy, 1-2 cm. long; spikes elongated terminal, the stem-like branches bracteate, densely flowered; petals oblong, obscurely lobed, posterior; stamens 3, posterior; capsule depressed globose, 3 mm. in diameter, 4-lobed, 4-cuspidate; seeds smooth.

In low saline places. Portugese Bend; Elsinore; also at San Diego and Tia Juana. April-May.

Family 41. CRASSULACEAE. STONE-CROP FAMILY.

Mostly succulent or fleshy herbs with cymose or rarely solitary, regular or symmetrical flowers. Stipules none. Calyx persistent, free from the ovary or ovaries, 4-5-cleft or 4-5-parted. Petals equal in number to the calyx-lobes, distinct or somewhat united below, persistent. Stamens of the same number or twice as many with filiform or subulate filaments and longitudinally dehiscent anthers. Receptacle with a scale at the base of each carpel. Carpels equal to the calyx-lobes in number, distinct or united below, with subulate or filiform styles and numerous ovules. Follicles membranous or coriaceous, 1-celled, dehiscent along the ventral suture. Seeds minute; embryo terete, imbedded in fleshy endosperm.

Plants not minute.

Petals distinct or only slightly united at base, spreading.

Leaves not linear; petals distinct.

1. SEDUM.

Leaves linear; petals slightly united at base.

2. HASSEANTHUS.

Petals united into a tube at base.

Petals spreading.

3. STYLOPHYLLUM.

Petals erect.

4. DUDLEYA.

Plants minute, fleshy.

5. TILLAEA.

1. SEDUM L.

Fleshy mostly glabrous erect or decumbent herbs with mostly alternate entire or dentate leaves and per-

fect flowers in terminal often 1-sided cymes. Calyx 4-5-lobed. Petals 4-5, distinct. Stamens 8-10, perigynous, the alternate ones usually attached to the petals, their filaments filiform or subulate. Scales of the receptacle entire or emarginate. Carpels distinct or united at the base; styles short.

1. *S. obtusatum* Gray. Glaucous and often mealy, from a branched rooting caudex, 10-15 cm. high, simple; leaves very thick, obovate or spatulate, flat, 15-20 mm. long; cymes of rather numerous scattered branches; pedicels 2-4 mm. long; petals oblong-lanceolate or obovate, acute, pale yellow, 6-8 mm. long, little exceeding the stamens and style; calyx broadly campanulate, sepals 3-4 mm. long, broad, obtusish.

Mount Disappointment, *Davidson*.

2. *S. spathulifolium* Hook. Similar in habit to the last, but the cyme approximate; pedicels shorter or the flowers sessile; sepals 3 mm. long, ovate, acute; petals yellow, lanceolate, acute, 6-8 mm. long, scarcely exceeding the stamens and style.

Lytle Creek Canyon near the falls.

2. *HASSEANTHUS* Rose.

Stems several, arising from small globose or oblong corms. Basal leaves linear, terete, narrowed below into flattened petioles; stem-leaves narrowly ovate, turgid but somewhat flattened. Calyx 5-lobed. Corolla-segments united at base into a short tube, yellow or white changing to purple. Carpels 5, united at base, widely spreading.

1. *H. elongatus* Rose. Stems slender, 10-15 dm. high; leaves linear, elongated, not at all variegated; cyme branches simple, widely spreading, 2-4 cm. long; calyx-lobes oblong; corolla bright yellow.

Described from specimens collected in the San Joaquin Hills by the author. What seems to be the same has also been collected in the Santa Ana Mountains by Helen D. Geis.

2. *H. multicaulis* Rose. Perennial by an oblong corm, 2-3 cm. long; stems 2-5, rather stout, 1-1.5 cm. high, variegated, glabrous, not at all glaucous; basal leaves 3-4 cm. long, terete, acute; stem leaves 1-2.5 cm. long, ovate-oblong, acute or acuminate, turgid or somewhat flattened; inflorescence of several second, many-flowered racemes; flowers subsessile; calyx-lobes ovate, obtuse; flower-buds pinkish, obtuse; corolla-lobes widely spreading above the middle, pale yellow, tinged with red, 7-8 mm. long, slightly united at base.

Described from specimens collected by Dr. Hasse on sterile clay bluffs near Santa Monica.

3. **STYLOPHYLLUM** Britton & Rose.

Perennials with more or less branched rootstocks; basal leaves linear elongated or flattened but always narrow, sometimes abruptly widened below into a broad clasping base; flowering stems with long sessile leaves not clasping at base. Calyx 5-lobed, the lobes ovate, equal and small. Corolla campanulate, not angled, white, red or yellowish, its lobes broad, thin and spreading, united below into a tube. Stamens 10, borne on the corolla-tube. Carpels 5, united below, generally spreading.

3. **S. densiflorum** Rose. Glauous throughout from more or less branching rootstocks; leaves numerous, erect, nearly terete, acute, 6-12 cm. long; flowering branches slender and weak; inflorescence a rather dense compact cyme, its ultimate branches rather short, 4-8-flowered; pedicels short, 1-3 mm. long; calyx 2 mm. long, its lobes twice as long as its tube, broadly ovate to orbicular, obtuse; corolla white or pinkish, 6 mm. long, its segments spreading, distinct nearly to the base. (*Cotyledon nudicaule* Abrams.)

Frequent on rocky cliffs in the San Gabriel Canyon.

Two other closely related species, *S. insulare* Rose and *S. hassei* Rose, are found on Santa Catalina. The first has a very thick woody caudex, 6-8 cm. thick, and short stout panicle branches, the second has a slender elongated caudex, 2-3 cm. thick, and slender panicle branches.

4. **DUDLEYA** Britton & Rose.

Caulescent or acaulescent perennials with flat linear to ovate basal leaves and yellow, orange, red or rarely white flowers, mostly in panicles. Leaves of the flowering branches usually much shorter and relatively broader than the basal ones, sessile or clasping. Calyx conspicuous, 5-lobed, the lobes erect, linear-lanceolate to ovate, obtuse to acuminate. Corolla nearly cylindric, or somewhat angled, the segments united below the middle, erect, or their tips somewhat spreading, obtuse to acuminate. Stamens twice as many as the calyx-lobes, distinct. Carpels erect, many-seeded. (*Cotyledon* in part.)

Leaves spatulate to ovate, rather thin.

Leaves densely white-mealy; rosettes large.

Leaves green or glaucous, not mealy.

Herbage glaucous.

Herbage green.

Leaves lanceolate to nearly linear, thick.

Corolla pale greenish yellow.

Corolla reddish, at least in age.

1. *D. pulverulenta*.

2. *D. minor*.

3. *D. ovatifolia*.

4. *D. brauntoni*.

Leaves very glaucous.

Leaves not at all glaucous at flowering time.

5. *D. elongata*.

6. *D. lurida*.

1. *D. pulverulenta* (Nutt.) B. & R. Densely white-mealy throughout; caudex short and very stout; rosulate leaves rather thin and flaccid, in a flattened large rosette, broadly spatulate, abruptly acute, 5-10 cm. long; scapes 4 dm. high or more, stout with broadly cordate rather numerous acute leaves, the lower sometimes ovate, acuminate; inflorescence of 2-6 elongated simple racemes; pedicels mostly horizontal, slender, 6-15 mm. long; flowers erect or ascending; sepals ovate, acute, 4-6 mm. long; corolla somewhat contracted above, reddish, about 14 mm. long, petals carinate with a prominent mealy-glaucous midvein. (*Cotyledon pulverulenta* Benth. & Hook.)

Frequent in the chaparral belt on rocky slopes in all our mountains. July-August.

2. *D. minor* Rose. Acaulescent, or very old plants with a carrot-shaped rootstock 5 cm. long, crowned by a small rosette of spreading leaves; leaves rhomboid-ovate, the large ones 5-7 cm. long, narrowed at base, abruptly acuminate, glaucous; inflorescence slender, with a few elongated 1-sided racemes; pedicels slender, 10-15 mm. long; calyx 5-7 mm. long, its lobes ovate to ovate-lanceolate, acute; corolla yellow or pale orange, 12 mm. long, its tube 2 mm. long.

Originally described from plants collected by Dr. Hasse in the San Gabriel Canyon, altitude about 2000 feet. Wilson's trail, altitude 2500 feet, on rocky banks. The true relationship of this and the following is not clear; they need intensive study in the field and garden.

3. *D. ovatifolia* Britton. Glabrous, low, green, 1.5 dm. high or less; flowering stems rigid; basal leaves ovate, shining above, acute, about 2 cm. long; leaves of the flowering stems ovate, or the lower ovate-lanceolate, obtuse or the lower acute, 5-8 mm. long; cymes few-flowered; pedicels very slender, 1 cm. long or less; flowers about 1 cm. long; calyx segments triangular-ovate-lanceolate, about 2.5 mm. long, nearly as long as the corolla-tube; corolla bright yellow, its segments lanceolate, acute.

Described from specimens collected in the Santa Monica Mountains by H. M. Hall.

4. *D. brauntoni* Rose. Cæspitose, the rootstocks crowned by 6-8 rosettes of leaves; leaves elongated, strap-shaped, becoming 20 cm. long and 2 cm. broad, but often at flowering time only 10 cm. long and 1 cm. broad, pale green and very glaucous on the face, acute; flowering stems usually stout, 3-6 dm. long, pale green, their lower leaves often quite large, the upper ones ovate, acute, thickish, slightly cordate at base; inflorescence at first somewhat compact, of 3-4 branches, these finally much elongated, 1-2 dm. long; pedicels very short, 1-3 mm. long, not elongated in fruit; calyxlobes broadly ovate, 4-5 mm. long, acute; segments of corolla pale greenish yellow, 10-12 mm. long, erect.

Described from plants collected by Ernest Braunton on Elysian Hills, Los Angeles.

5. **D. elongata** Rose. Stems elongated, at length 2-4 dm. long, simple or branched; leaves nearly linear, broadest near the base, very glaucous, 4-8 cm. long, 9 mm. wide or less, acute to acuminate; flowering stems leafless below, leafy above; the leaves ovate, acute, cordate, 1 cm. long or less; inflorescence cymose-paniculate; pedicels very short, 1-2 mm. long; calyx-lobes ovate, acute, 4 mm. long, twice as long as the tube; corolla 12 mm. long, at first reddish yellow, in age deep red.

Along the coast. Described from specimens from near San Pedro, collected by Dr. Hasse.

6. **D. lurida** Rose. Acaulescent; basal leaves ascending or nearly erect, very numerous, not at all glaucous at flowering time, at last deeply bronzed, lanceolate, acuminate, 10-15 cm. long, 10-22 mm. broad at the middle, fleshy but not very thick; flowering stems stout, purplish, 4-5 dm. tall, their leaves broadly ovate, 8-12 mm. long, rather slender; calyx-lobes ovate, acute, 5-6 mm. long, reddish; corolla reddish, 12-15 mm. long, the segments erect, acute.

Frequent in the Santa Monica Mountains and Verdugo Hills.

5. TILLAEA.

Minute somewhat succulent and glabrous herbs with opposite entire leaves and minute axillary mostly white flowers. Sepals and petals 3-5, distinct or united at the base. Stamens as many. Carpels as many, distinct; styles short-subulate; ovules 1-many. Seeds striate longitudinally.

1. **T. minima** Miess. Diffusely branched, 2-6 cm. high, erect or ascending; leaves about 2 mm. long, ovate, acute, connate at base; flowers in short leafy axillary panicles; sepals 4, scarcely 1 mm. long, oblong-ovate, acute, slightly exceeding the linear-lanceolate acuminate petals; carpels of about the same length, acute; seeds usually solitary.

Common on sandy ground throughout the valley region.

Family 42. SAXIFRAGACEAE. SAXIFRAGE FAMILY.

Herbs with alternate opposite or basal, chiefly exstipulate leaves and mostly perfect solitary, racemose, cymose or paniculate flowers. Calyx 4-5-lobed or 4-5-parted, free or adnate to the ovary, usually persistent. Petals 4-5, perigynous. Stamens equaling the petals in number or twice as many, perigynous. Carpels 1-several, more or less united into a compound superior or inferior ovary; styles distinct or united. Fruit a capsule or follicle. Seeds usually numerous; endosperm generally copious, fleshy; embryo small, terete.

Ovary with 2, rarely more, cells.

Stamens 5.

Stamens 10.

Ovary 1-celled.

Stamens 5.

Stamens 10.

1. THEROFON.

2. SAXIFRAGA.

3. HEUCHERA.

4. LITHOPHRAGMA.

1. THEROFON Raf.

Perennial herbs with creeping rootstocks and leafy stems. Leaves alternate, round-reniform, palmately lobed and incised or toothed with callous glandular tips; petiole mostly with a stipular dilation at base. Flowers white, paniculate or in corymbose cymes. Calyx 5-lobed, the tube adherent to the ovary, at length globular or ovate. Petals 5, entire. Stamens short, alternating with the petals; anthers 2-celled. Ovary 2-celled. Fruit a capsule, dehiscent down the styliferous beaks. Seeds ovoid, minutely papillose.

1. **T. elatum** (Nutt.) Greene. Slender, 3–6 dm. high, glabrous or somewhat glandular-pubescent, the dilated bases of the petioles with brown bristly hairs, otherwise smooth or nearly so; leaves thin membranous, 5–7 cm. broad, deeply 5–7-lobed; calyx-lobes lanceolate-triangular, often slightly toothed above; tube oval, urceolate in fruit; petals cuneate-elliptic, obtuse, 3.5 mm. long, much exceeding the calyx-lobes; claw very short. (*Boykinia occidentalis* T. & G.)

Topango Canyon, *Davidson*.

2. **T. rotundifolium** (Parry) Wheelock. Stem villous-pubescent and glandular, 4–8 dm. high, leafy; leaves 5–10 cm. broad, crenately incised and toothed, thin, nearly glabrous above, petioles densely villous, the slightly dilated base with brown bristly hairs; peduncles axillary and terminal; flowers short-pedicelled, secund on the few elongated branches; calyx campanulate, becoming broadly urceolate in fruit, its lobes entire, acute; petals 2–2.5 mm. long, scarcely exceeding the calyx-lobes, spatulate; the claw twice as long as the rounded blade. (*Boykinia rotundifolia* Parry.)

Frequent in canyons in the San Gabriel Mountains, 2500–4500 feet altitude. May–July.

2. SAXIFRAGA L. SAXIFRAGE.

Stemless or short-stemmed herbs with alternate or mostly basal leaves and corymbose, paniculate or rarely solitary small flowers. Calyx 5-lobed or 5-parted, its tube free or adnate to the base of the ovary. Petals 5, equal, entire. Stamens 10, inserted with the petals; filaments filiform; anthers 2-celled. Carpels 2 or rarely 3, distinct or more or less united into a 2-celled ovary;

styles distinct, persistent, at length divergent. Fruit of 2 follicles or a 2-lobed or 2-beaked capsule, dehiscent down the beaks or the ventral suture. Seeds smooth.

1. *S. californica* Greene. Scape 15–45 cm. high; leaves few, rather thick, reddish veined, sparsely glandular-villous, oval, oblong or elliptic, 25–50 mm. long, coarsely crenate to repand-denticulate; petioles rather broad, 12–25 mm. long; inflorescence cymose-paniculate; calyx nearly free from the ovary, its segments reflexed; petals oblong, 3 times as long as the calyx, white or rose-tinted; filaments subulate, inserted under the edge of an elevated perigynous disk.

Arroyo Seco, *Mc Clatchie*; near Glendale, *Davidson*.

3. HEUCHERA L.

Perennial herbs with stout rootstocks, mostly basal long-petioled rounded usually cordate leaves, and slender scapes. Inflorescence in ours paniculate, bracteate, bearing small mostly purple flowers. Calyx campanulate or in fruit somewhat urceolate, 5-lobed, the lobes obtuse and sometimes unequal, the tube coherent with lower half of the ovary. Petals unguiculate, small, entire, inserted on the throat of the calyx. Stamens 5, exerted or included; anthers 2-celled. Ovary and capsule 1-celled, with 2 parietal placentæ, more or less 2-beaked, the beaks tapering into the slender styles, dehiscent between the beaks. Seeds numerous, minute, papillose.

1. *H. elegans* Abrams. Scape 25–35 cm. high, villous-hirsute; leaves thickish, round-cordate, 1–2 cm. broad, crenately lobed and toothed, the margins ciliate, otherwise glabrous; petioles 2–2.5 cm. long, villous; stipules scarious, the free portion narrowly lanceolate, 2–3 mm. long, ciliate with long slender hairs; panicles 14–18 cm. long, villous-pubescent throughout and somewhat glandular, its branches cymose, 3 cm. long, usually 9-flowered, the uppermost becoming reduced; bracts subtending the branches about 4 mm. long, lacerate, those subtending the pedicels similar but somewhat reduced; calyx pink, villous, 8–10 mm. long, narrowly campanulate, its lobes narrowly oblong, about 3 mm. long; petals white, lanceolate-spatulate, 5–6 mm. long, narrowed below to a slender claw; stamens included.

Frequent in rocky places in the higher altitudes of the chaparral belt. Mount Gleason; Mount Lowe; Mount Wilson.

4. LITHOPHRAGMA T. & G.

Slender perennial herbs from mostly grumous roots, with chiefly basal round-cordate toothed or lobed leaves,

their petioles stipuliform at base, cauline few on the simple stems. Flowers few in a simple terminal raceme. Calyx campanulate or turbinate, 5-lobed, free from the ovary or more or less adnate to it. Petals 5, exserted, 3-7-lobed or sometimes entire. Stamens 10, included; anthers cordate. Ovary 1-celled, with 3 parietal placentaë; styles 3, short. Fruit a 3-valved, many-seeded capsule.

1. *L. affinis* Gray. Stems 1 or several, 15-40 cm. high, scabrous-hirsute; basal leaves few, round-reniform, slightly lobed, 2-3 cm. broad; cauline 3-lobed to the middle, the lobes coarsely toothed; calyx 5 mm. long, turbinate, the tube more or less adherent to the ovary; pedicels about equaling or slightly exceeding the calyx; lower petals 8-10 mm. long, 3-toothed, the upper slightly smaller, entire; seeds faintly striate-pitted or almost smooth. (*Tellima affinis* Boland.)

Occasional on shady banks in the foothills, below 4000 feet altitude. March-May.

Family 43. GROSSULARIACEAE.

GOOSEBERRY FAMILY.

Erect branching shrubs with alternate palmately lobed, often resinous-glandular or viscid leaves. Stipules when present adnate to the petiole. Flowers racemose, rarely solitary on 1-2-leaved axillary shoots; pedicels subtended by a bract and usually bearing 2 bractlets at about the middle. Calyx-tube adnate to the globose ovary and more or less produced above it. Petals 5 or rarely 4, erect, mostly smaller than the calyx-lobes. Stamens equaling the petals in number and alternate with them. Ovary 1-celled with 2 parietal placentaë; styles 2, more or less united; stigmas terminal. Fruit a berry, crowned with the withered remains of the flower.

Pedicels jointed beneath the ovary; plants without nodal spines.

1. RIBES.

Pedicels not jointed; plants with nodal spines.

2. GROSSULARIA.

1. RIBES L. CURRANT.

Unarmed or rarely bristly shrubs, with palmately veined and usually lobed leaves. Racemes several-

many-flowered. Pedicels jointed below the ovary, usually with a pair of bractlets just below the joint. Ovary not spiny. Fruit disarticulating from the pedicel.

- | | |
|---|------------------------------|
| Stems bristly; calyx saucer-shaped. | 1. <i>R. montigenum</i> . |
| Stems not bristly. | |
| Calyx smooth, yellow; leaves involute in the bud. | 2. <i>R. gracillimum</i> . |
| Calyx pubescent, not yellow; leaves plicate in bud. | |
| Leaves evergreen, holly-like. | 3. <i>R. viburnifolium</i> . |
| Leaves deciduous, not holly-like. | |
| Bracts herbaceous, toothed. | 4. <i>R. cereum</i> . |
| Bracts scarious, entire or ciliate. | |
| Style glabrous; ovary with only gland-tipped hairs. | 5. <i>R. nevadense</i> . |
| Style villous below; ovary canescent. | |
| Flowers pink or purple, 8-10 mm. long. | 6. <i>R. malvaceum</i> . |
| Flowers white or greenish-white, 3-4 mm. long. | 7. <i>R. indecorum</i> . |

1. *R. montigenum* McClatchie. A spreading shrub, 3-6 dm. high, the stems more or less bristly, with short nodal spines; leaves usually about 2 cm. wide, deeply 5-lobed or cleft, the lobes incised serrate, more or less pubescent and glandular; racemes short, few-flowered; calyx-tube saucers shaped, glandular bristly; the lobes 3-4 mm. long; berries red, glandular-bristly.

Widely distributed through the mountains of western America, usually at high altitudes; summit of Mt. San Antonio.

2. *R. gracillimum* Coville & Britton. Shrub, 8-15 dm. high, nearly glabrous, glandless; leaves ovate to rounded in outline, about 2 cm. wide, 3-lobed and sparingly dentate; racemes 5-15-flowered; 5 cm. long; calyx yellow, the tube 6-8 mm. long, the lobes oval, 3-4 mm. long; petals obovate, 2-3 mm. long.

On partially wooded slopes and ravines; central and southern California; Eaton's Wash near Pasadena; Los Angeles River, San Fernando Valley.

3. *R. viburnifolium* Gray. An evergreen, staggling shrub with resinous-glandular twigs; leaves thick, resinous dotted beneath, ovate to obovate, sparingly repand dentate or sometimes entire; racemes few-several-flowered; pedicels filiform; calyx tube turbinate, the lobes oval, rose-colored, spreading; petals greenish, very small.

On the islands off the coast of southern California and on the mainland in San Diego County, and Lower California.

4. *R. cereum* Dougl. An erect much branched unarmed shrub, 4-10 dm. high, minutely pubescent and usually resinous-dotted; leaves rounded or reniform, 15-25 mm. wide, more or less 3-lobed, crenately toothed, of rather firm texture; racemes drooping, closely

3-5-flowered; pedicels shorter than the bracts; calyx white or greenish, the tube cylindric, 8-10 mm. long, much longer than the ovate recurved lobes; petals rounded; berry reddish and sweet.

A northern species belonging to the Canadian Zone; Mt. San Antonio and the San Bernardino Mountains.

5. *R. nevadense* Kell. Rather slender, loosely branching shrub, 1-2 m. high, older bark flaky deciduous; leaves 5-10 cm. broad, thin, not rugose, bright green and glabrous above, paler beneath and sparsely pubescent; stipular base of petiole ciliate-margined with long coarse plumose hairs; racemes rather short and dense, on rather long pendulous peduncles; flowers rose-colored; calyx-tube urceolate, 3 mm. long, lobes spreading, about equaling the tube; berry small, globose, glabrous, black.

Strain's Camp, Mount Wilson. Frequent along streams in the San Antonio and San Bernardino Mountains, in the pine belt. May.

6. *R. malvaceum viridifolium* Abrams. Shrub 1-2 m. high, the young branches short-pubescent and more or less densely glandular with stalked glands; leaves rather thick, 3-7 cm. broad, slightly or not at all rugose, minutely scabrous and somewhat glandular with sessile glands above, pale and glandular-pubescent beneath; petioles beset with stalked glands and more or less puberulent; inflorescence glandular-pubescent, racemes rather long-peduncled, drooping, many-flowered; bracts ovate, 1 cm. long, ciliate-toothed above; pedicels 3-4 mm. long; calyx rose-colored below, becoming nearly white above, its tube cylindric, pubescent within, 12 mm. long; its lobes broadly ovate, rounded at apex, 4-5 mm. long; petals rounded, 2 mm. broad; anthers nearly sessile, 2 mm. long; style pubescent; berries becoming reflexed at maturity, on short pedicels, pubescent and rather sparsely beset with coarse gland-tipped hairs, purplish, 1 cm. long.

Occasional in the Santa Monica and San Gabriel Mountains, on north wooded slopes below 4000 feet altitude. March-April.

7. *R. indecorum* Eastw. An erect shrub, 1-2 m. high, with shreddy bark and tomentose and glandular twigs; leaves 2-4 cm. broad, 3-lobed, finely rugose on the upper surface, glandular-pubescent and sparsely silky, the lower surface densely white-tomentose; racemes 2-3 cm. long, short-peduncled; flowers on very short pedicels; bracts lanceolate, nearly as long as the pale pink or white calyx; calyx-tube 3-4 mm. long, the lobes oval, about half as long; style hairy at base; ovary densely tomentose.

In the chaparral and along dry washes, from Ventura County to northern Lower California; Arroyo Seco; San Gabriel Wash; Claremont.

2. *GROSSULARIA* Mill. GOOSEBERRY.

Shrubs armed with simple or 3-forked nodal spines or rarely spineless. Racemes few-flowered, the flowers bracteate; pedicels not jointed without bractlets or these minute and at the base of the pedicel. Ovary often spiny. Fruit not disarticulating from the pedicel.

Flowers 5-merous.

Berry armed with prickles.

Herbage glandular-pubescent.

1. *G. amara*.

Herbage not glandular-pubescent.

Leaves shiny, minutely and sparsely pubescent; calyx-lobes twice the length of the tube.

2. *G. hesperia*.

Leaves canescent; calyx-lobes equaling the tube.

3. *G. roezli*.

Berry without prickles, glabrous or pubescent.

4. *G. parishii*.

Flowers 4-merous, bright red and showy.

5. *G. speciosa*.

1. *G. amara* (McClatchie) Coville & Britton. Shrub, 1-3 m. high, the rigid stems and branches beset with yellow-brown commonly triple spines, often hispid; leaves, inflorescence and young branches glandular-hirsute; leaves thin, 1-4 cm. broad, 3-5-lobed and incised; peduncles 1-2-flowered; bracts round-ovate, usually 3-lobed, 6 mm. long; calyx-tube oblong-campanulate, 6 mm. long; lobes reflexed, 6 mm. long, purplish red; petals pinkish white, rounded, erose-toothed at summit; stamens equaling or slightly exceeding the petals; anthers sagittate, mucronate, purplish; berry 12-20 mm. broad, densely covered with glandular bristles.

Frequent on shaded slopes in the San Gabriel Mountains below 4000 feet altitude. February-March.

2. *G. hesperia* (McClatchie) Coville & Britton. Shrub, 1.5-3 m. high, with spreading branches; stems smooth, beset with dark-colored commonly single spines; inflorescence and young branches puberulent; leaves thin, 12-20 mm. broad, 3-5-lobed, the lobes incised; peduncles 1-2-flowered; bracts broad, fan-shaped with ciliated membranous pink margins; calyx-tube campanulate, slightly inflated, about 2 mm. long, lobes greenish-red, 6-8 mm. long, petals cuneate-oblong, 3-4 mm. long, 2-3-toothed at summit or entire; filaments 4-6 mm. long; anthers mucronate, greenish; berry 12-20 mm. in diameter, densely beset with rather long spines.

Common in the Santa Monica and San Gabriel Mountains below 3000 feet altitude. January-February.

3. *G. roezli* (Regel) Coville & Britton. Shrub, 10-15 dm. high with pubescent but not bristly branches, the nodal spines straight or recurved, brownish, 1.5 cm. long; leaves 15-25 mm. broad, reniform-rounded in outline, 3-5-lobed and incisely dentate-crenate, finely pubescent on both sides; peduncles 1-3-flowered; ovary usually white-hairy, bristly; calyx-tube 5-7 mm. long, purplish, pubescent, the lobes lanceolate, 7-10 mm. long.

Southern Sierra Nevada southward to the San Bernardino Mountains; North Baldy; Mt. San Antonio, and Santiago Peak, Santa Ana Mountains.

4. *R. parishii* Heller. Shrub, 1-2.5 m. high, spreading, branches tomentose, thorns single or sometimes triple; leaves roundish, 3-5-lobed, the lobes incisely toothed, sparsely tomentose; peduncles slender, elongated, drooping, 3-9-flowered; pedicels with broad bract at base; calyx purplish, 6-8 mm. long; tube short, campanulate,

much exceeded by the oblong lobes; petals white, fan-shaped, margins convolute; filiform filaments and style much exerted; berry small, glabrous, black.

Oak Knoll, near Pasadena, *McClatchie*; San Bernardino Valley, *Parish*.

5. *R. speciosum* Pursh. Evergreen shrub, 1.5–3 m. high, with leary red bristly branches; subaxillary spines 3, united at base; leaves subcoriaceous, dark green, smooth and shining above, rounded, 3-lobed, lobes short, crenately toothed; peduncles pendulous, 2–5-flowered; flowers bright red, drooping; calyx 12–18 mm. long, its tube short, somewhat inflated, lobes oblong, not spreading; petals about $\frac{2}{3}$ the length of the calyx-lobes; filaments filiform, much exceeding the calyx; anthers small, oval; berry small, densely prickly.

Frequent in the foothills. March–April.

Family 44. PLATANACEAE. PLANE-TREE FAMILY.

Large trees with thin exfoliating bark, alternate petioled palmately lobed leaves and small green monoecious flowers in dense globular heads. Receptacle somewhat fleshy. Calyx of 3–8 externally minute sepals. Corollas of as many thin glabrous petals. Staminate flowers with stamens as many as sepals and opposite them; filaments short; anthers longitudinally dehiscent. Pistillate flowers with 2–8 distinct pistils; ovary linear, 1-celled; style elongated; stigma lateral. Fruit a dense head, composed of numerous narrowly obpyramidal nutlets which are densely pubescent below with long hairs; seed pendulous; endosperm thin; cotyledons linear.

1. PLATANUS L. PLANE-TREE or SYCAMORE.

Characters of the family.

1. *P. racemosa* Nutt. A large widely branching tree, 10–25 m. high; leaves stellate-pubescent when young, becoming glabrate, 10–15 cm. broad and scarcely as long, mostly 5-lobed, truncate or somewhat cordate at base; lobes acute, the lower smaller, bluntly cuspidate at the ends of the veins; petioles shorter than the leaves; stipules larger on young twigs; staminate heads several; pistillate heads 3–5.

Common along all the streams, mostly below 3000 feet altitude. March.

Family 45. ROSACEAE. ROSE FAMILY.

Herbs, shrubs or trees with alternate mostly stipulate leaves and regular flowers. Calyx free from or adnate to the ovary, usually 5-lobed, sometimes bracteolate. Petals distinct, equal in number to the calyx-lobes or none. Stamens usually numerous, inserted on the calyx; anthers 2-celled, longitudinally dehiscent or rarely by pores. Carpels 1-many, distinct or united. Ovary 1-several-celled. Seeds 1 or few in each cell, anatropous; endosperm present or wanting.

Herbs.

Petals present.

Styles terminal; ovules pendulous.

Petals yellow.

Petals white.

Styles lateral; ovules ascending.

Styles nearly basal.

Petals none; pistil 1.

3. *POTENTILLA*.

6. *HORKELIA*.

4. *ARGENTINA*.

5. *DRYMOCALLIS*.

9. *ALCHEMILLA*.

Shrubs.

Stems unarmed.

Fruit an achene or follicle.

Flowers solitary or somewhat fascicled.

Flowers in terminal racemes.

Leaves alternate, toothed or lobed.

Leaves fascicled, entire, minute.

Fruit a cluster of drupelets, berry-like.

7. *CERCOCARPUS*.

1. *SERICOTHECA*.

8. *ADENOSTOMA*.

2. *RUBUS*.

Stems prickly.

Calyx not fleshy; fruit a cluster of drupelets.

2. *RUBUS*.

Calyx fleshy; enclosing the achenes.

10. *ROSA*.

1. SERICOTHECA Raf.

Unarmed shrubs with simple toothed or lobed exstipulate deciduous leaves and terminal panicles of numerous white flowers. Calyx deeply 5-cleft, nearly rotate. Petals 5, rounded. Stamens 20, inserted on an annular perigynous disk. Pistils 5, distinct, becoming 1-seeded hairy carpels, tardily dehiscent by the dorsal suture or indehiscent (*Holodiscus* Maxim.).

Inflorescence well compound, ample; leaves 3-6 cm. long.

1. *S. franciscana*.

Inflorescence small and narrow, a simple raceme or with a few short branches.

2. *S. concolor*.

1. *S. franciscana* Rydb. Shrub, 1–2 m. high; the branches short, rigid; bark grayish brown, more or less shreddy; leaves ovate, 3–6 cm. long, cuneately narrowed to a short winged petiole, pinnately lobed or toothed above the middle, green and nearly glabrous above, whitish tomentose beneath; panicles erect, branching; carpels hirsute.

Occasional in the San Gabriel Mountains in the chaparral belt.

2. *S. concolor* Rydb. A low shrub with spreading branches, 1 m. high or less; leaves sessile, cuneate-obovate, 5–12 mm. long, toothed above the middle, finely and densely canescent on both surfaces; inflorescence 5–8 cm. long, with a few short spreading branches.

A high alpine species found on the summit of Mt. San Antonio and also on San Geronio.

2. RUBUS L.

Low shrubs or trailing vines, usually prickly, with alternate leaves, the stipules adnate to the petioles. Flowers terminal or axillary, solitary, racemose or panicle, white or purplish, mostly perfect. Calyx persistent, bractless, deeply 5-parted. Petals 5. Stamens many, inserted on the calyx, distinct. Carpels many, inserted on a convex or elongated receptacle, ripening into drupelets and forming an aggregate fruit. Ovules 2, 1 abortive; style terminal, slender. Seed pendulous.

Leaves simple, palmately lobed; stems unarmed. 1. *R. parviflorus*.
Leaves 3–5-foliate; stems prickly.

Drupelets separating from the receptacle in fruit.

2. *R. leucodermis*.

Drupelets persistent on the receptacle.

3. *R. vitifolius*.

1. *R. parviflorus* Nutt. (THIMBLE BERRY.) Stems erect, 1–2.5 m. high, without prickles; bark smooth or somewhat glandular-pubescent, becoming brown and shreddy; leaves palmately 5-lobed, cordate at base, unequally serrate, 10–15 cm. broad, glabrous, or somewhat tomentose on the veins beneath; petioles and peduncles hirsute-glandular; flowers few, corymbose, white, 2–4 cm. broad; calyx-lobes tipped with a long slender appendage; fruit separating from the receptacle when ripe, hemispheric, red. (*R. nutkanus* Mocino.)

In moist shady places in the San Antonio and San Bernardino Mountains in the pine belt. April–June.

2. *R. leucodermis* Dougl. (RASPBERRY.) Stems erect, 4–8 dm. high, glaucous, armed with stout, straight or recurved prickles; leaves 3-foliate or rarely 5-foliate; leaflets ovate to lanceolate-acuminate, doubly serrate, white tomentose beneath; the veins, petioles and peduncles prickly; stipules setaceous; flowers few, corymbose, 1 cm. broad; sepals lanceolate, long acuminate, exceed-

ing the petals; ovaries tomentose; fruit separating from the receptacle when ripe, yellowish red with a white bloom and agreeable flavor.

Occasional in all our mountains in the pine belt. May-June.

3. *R. vitifolius* C. & S. (BRAMBLE or BLACKBERRY.) Stems woody, weak and trailing or suberect, somewhat glaucous, armed with straight, slender prickles, 1-6 m. long; leaves pinnately 3-5-foliate or those of the flowering branches only deeply lobed; leaflets ovate to oblong, coarsely toothed, glabrous or more or less pubescent; flowers imperfect, staminate large with elongated petals; pistillate small with broad petals; fruit persistent on the receptacle, oblong, black and sweet.

Frequent in the foothills and valleys, mostly along streams. January-April.

3. POTENTILLA L.

Ours perennial or rarely annual herbs with digitately or pinnately compound leaves and cymose yellow perfect flowers. Calyx persistent, its tube concave or hemispheric, 5-bracteolate, 5-lobed. Petals 5, mostly obovate and emarginate. Stamens commonly 20, inserted on an annular disk very near the base of the receptacle; filaments filiform or spatulate but not flattened. Pistils many, becoming dry achenes in fruit, inserted on a hemispheric or conic receptacle; style terminal or nearly so, deciduous; ovules pendulous, anatropous.

1. *P. multijuga* Lehm. Perennial; stems erect, 3-7 dm. high, slightly silky-strigose, more or less leafy; stipules large, 1-2 cm. long, ovate, entire; basal leaves numerous, often 2-3 dm. long, slightly hairy or glabrate, pinnate with 6-13 pairs of leaflets; leaflets obovate, cuneate, 1-4 cm. long, coarsely toothed above the middle; cauline leaves smaller and with fewer leaflets; flowers about 15 mm. broad, in rather narrow cymes; pedicels slender; bractlets oblong, about $\frac{2}{3}$ as long as the ovate calyx-lobes; petals broadly obcordate, about $\frac{1}{3}$ longer than the calyx-lobes; style filiform.

Playa del Rey, *Hasse*. A rare plant not otherwise known.

4. ARGENTINA Lam.

Perennial herbs growing in damp ground and spreading by slender runners, with thick and fascicled roots and pinnate leaves. Flowers borne on simple pedicels from the axils of the leaves formed on the runners, 5-merous and with 5 bractlets. Calyx nearly wheel-shaped. Petals yellow, broadly elliptic to nearly orbicular, obtuse. Stamens 20-25, inserted closely around the base of the receptacle; filaments filiform, rather short. Receptacle hemispheric, bearing numerous pistils, these

becoming dry achenes in fruit. Style filiform, lateral, attached at the middle of the ovary, somewhat persistent. Seeds ascending and amphitropous.

1. *A. anserina* (L.) Rydb. Main stem inconspicuous, producing many long runners; leaves 1-2 dm. long, abruptly pinnate with 9-31 larger leaflets and with smaller ones interposed, usually prostrate, slightly silky and green above, white-silky and tomentose beneath; larger leaflets oblanceolate, 1-3 cm. long, deeply and sharply serrate; flowers 1-2 cm. broad, on pedicels 3-20 cm. long; petals much exceeding the calyx.

Rather common in damp ground in the valleys. Flowering through the summer. (*Potentilla anserina* L.)

5. DRYMOCALLIS Fourr.

Erect more or less glandular or viscid herbs from perennial rootstocks, with pinnate leaves and cymose yellow 5-merous bracteolate flowers. Calyx saucer-shaped or hemispheric. Petals obovate, elliptic or nearly orbicular, obtuse. Stamens 20-30 on a persistent disk at base of receptacle. Receptacle hemispheric with numerous pistils which become dry achenes. Style basal, slightly thickened and glandular below, tapering at both ends or nearly filiform, rather persistent. Seed attached near the base, ascending, orthotropous.

1. *D. glandulosa* (Lindl.) Rydb. Stem erect, 3-6 dm. high, rather slender, slightly striate, viscid and glandular hairy at least above, nearly simple below, branched above; lower stipules lanceolate, the upper ovate and usually deeply toothed; basal leaves petioled, pinnate; leaflets 3-4 pairs, sparingly hairy, nearly glabrous above, obovate, mostly obtuse, simply or double serrate with broad teeth, 1-3 cm. long, the upper generally somewhat larger; cauline leaves short petioled, with 1-3 pairs of leaflets; flowers in an open many-flowered cyme, 10-15 mm. broad; bractlets linear-lanceolate, much shorter than the oblong or obovate-lanceolate acute sepals; petals obovate, about equaling the sepals, stamens 25. (*Potentilla glandulosa* Lindl.)

Frequent in the chaparral belt in all the mountains. Ours not typical, having usually smaller flowers and less acute sepals. March-July.

1a. *D. glandulosa monticola* Rydb. A more slender and smaller mountain form with smaller leaflets, more open but smaller cymes, shorter sepals, pale yellow petals, and often only 20 stamens. (*Potentilla glandulosa nevadensis* Wats.)

Frequent in the pine belt of all our mountains. May-August.

6. **HORKELIA** Cham. & Sch.

Perennial herbs with a thick woody caudex or rootstock covered with brown scales, pinnate leaves and cymose flowers. Calyx deeply campanulate to saucer-shaped, deeply 5-lobed, with 5 bractlets alternating with the lobes. Petals variable, unguiculate, white or rarely pale yellow. Stamens 5–20, inserted in the throat of the calyx-tube and remote from the base of receptacle; filaments dilated, petaloid. Receptacle hemispheric or conic with numerous pistils. Styles long and slender, generally thickened and somewhat glandular at base, deciduous. Ovules and seeds pendulous, anatropous.

1. **H. sericea** (Gray) Rydb. Stem rather stout, 3–6 dm. high, silky-pubescent, scarcely glandular; stipules ovate or lanceolate, 1–2 cm. long, often toothed; basal leaves numerous, rather short-petioled; leaflets 4–7 pairs, rather thick, densely and finely silky-canescens, obovate, 1–2.5 cm. long, rather coarsely somewhat crenately toothed, the upper confluent; cauline leaves similar but smaller with 2–5 pairs of leaflets; cyme rather dense; calyx cupulate; bractlets entire, ovate or ovate-lanceolate; lobes similar, slightly exceeding the bractlets; petals white, spatulate, 5–6 mm. long. (*H. californica sericea* Gray.)

Near Playa del Rey, not otherwise known south of Santa Barbara. March–May.

2. **H. puberula** (Greene) Rydb. Stems mostly several, 3–6 dm. high, branched, finely glandular-puberulent, leafy; stipules obovate, often toothed; basal leaves numerous, puberulent or glabrate; leaflets 5–8 pairs, obovate or cuneate-oblong, 1–2.5 cm. long; flowers about 1 cm. broad; calyx-tube cupulate; bractlets broadly lanceolate, exceeded by the ovate-lanceolate calyx-lobes; petals oblong-spatulate, scarcely exceeding the calyx-lobes. (*H. platycalyx* Rydb.)

Frequent in the foothills, mostly below 3000 feet altitude. March–May.

7. **CERCOCARPUS** H. B. K. MOUNTAIN MAHOGANY.

Unarmed evergreen shrubs or trees with simple stipulate leaves and small axillary or terminal solitary or somewhat fascicled apetalous flowers. Calyx salver-shaped, the 5-lobed limb deciduous. Stamens many, in 2 or 3 rows on the limb of the calyx. Pistil 1; style terminal; ovule solitary, ascending. Fruit a coriaceous terete villous achene, included in the elongated calyx-tube, caudate with the elongated plumose twisted style. Seed linear; endosperm none.

Leaves narrowly lanceolate, the margins entire, revolute.

1. *C. ledifolius*.

Leaves obovate to rounded, margins toothed above.

Leaves obovate, pubescent or glabrous beneath.

2. *C. betulaeifolius*.

Leaves oval to rounded, densely white downy beneath.

3. *C. traskiae*.

1. *C. ledifolius* Nutt. A shrub or small tree, 2-5 m. high; leaves narrowly lanceolate, the margins entire and revolute, 15-35 mm. long, thick coriaceous, resinous and glabrate above, tomentose beneath, narrowed at base to a short petiole; flowers sessile, tomentose; calyx 4 mm. broad, deeply toothed, the tube becoming 6-10 mm. long; tail of the achene 5-8 cm. long in fruit.

Inhabits the Arid Transition Zone from southeastern Washington to southern California and Arizona: Mt. Wilson, *Helen Geis*; North Baldy and Lone Pine Canyon, also in the San Bernardino Mountains.

2. *C. betulaeifolius* Nutt. A shrub or small tree, 2-5 m. high, with rather thin flaky gray bark and spreading or somewhat recurved branches; leaves thick, obovate, cuneate, entire below the middle, serrate toothed above, sometimes faintly so, distinctly veined on both surfaces, smooth above, pubescent beneath; calyx open campanulate, 6 mm. broad, the tube becoming 12-14 mm. long in fruit, somewhat contracted above; achene coriaceous, the plumose style about 7 cm. long.

Rather common in the chaparral belt of all the mountains. Flowering in March and fruiting in July.

3. *C. traskiae* Eastw. A small tree 1-2.5 m. high, with rough grayish brown bark and tomentose branchlets; leaves rounded to oval, 2-6 cm. long, dark green and glabrous above, densely white-tomentose beneath; calyx white-tomentose, 5-8 mm. broad, the tube 1 cm. long; tail of achene about 5 cm. long.

A rare species, known only from a small solitary grove in a narrow precipitous canyon on Santa Catalina Island.

8. ADENOSTOMA H. & A. CHAMISO.

Unarmed evergreen shrubs with small coriaceous entire fascicled stipulate leaves and small white flowers in terminal paniced racemes. Calyx obconic, 5-toothed, 10-striate. Petals 5, orbicular. Stamens 10-15, inserted in bundles alternate with the petals. Pistil 1, simple; style lateral; ovary 1-celled, 1-2-ovuled. Achene enclosed by the hardened persistent calyx-tube.

1. *A. fasciculatum* H. & A. Shrub 1-4 m. high with reddish virgate branches and grayish bark, becoming shreddy; stipules small, acute, leaves fascicled, linear-subulate, 4-8 mm. long, pungently acute, glabrous, often resinous; flowers crowded, sessile; calyx bracted at base, green, 2 mm. long, its lobes shorter than the small petals; ovary obliquely truncate.

Very common in the chaparral belt. April-June.

2. *A. sparsifolium* Torr. An arborescent, resinously glandular shrub, 2-6 m. high, with reddish brown trunks; leaves not fascicled, narrowly linear, 7-15 mm. long, glandular; flowers in open showy panicles; calyx-lobes rounded, whitish, 2 mm. long, half the length of the white petals.

A common species in the chaparral of the San Jacinto Mountains, extending southward to northern Lower California. It has also been collected in the Santa Monica Mountains, *Hasse*.

9. *ALCHEMILLA* L. LADY'S MANTLE.

Ours small annual herbs with leafy stems and minute green flowers in the axils of the palmately lobed leaves. Calyx-tube urceolate, its limb 4-parted with alternating minute bractlets. Petals none. Stamens 1 or 2, minute. Pistils 1 or 2, slender; style rising from near the base of the ovary; ovule 1, ascending. Achene ovate, compressed, enclosed in the persistent calyx.

1. *A. aiense* (L.) Scop. Slender, simple or much branched from the base, 4-10 cm. high; floriferous and hirsute throughout; leaves 3-parted, the segments 2-3-cleft; calyx-tube much contracted under the 4-parted limb.

Occasional in shady places or along streams in the foothills.

10. *ROSA* L. ROSE.

Prickly shrubs with odd-pinnate leaves, adnate stipules and large solitary or corymbose flowers. Calyx-tube globose or urceolate; its limb 5-parted; bractlets none. Petals 5, rounded, spreading. Stamens many on the silky disk, which lines the calyx-tube. Pistils many, included in the calyx-tube, but free and distinct; styles subterminal; ovules solitary, pendulous. Achene bony, enclosed in the fleshy enlarged red berry-like calyx-tube.

1. *R. californica* C. & S. Erect, branching, 1-3 m. high; prickles few, stout, usually recurved; foliage of firm texture, more or less glandular and tomentose; stipules entire; leaflets 5-7, ovate or oblong; serratures mostly simple, spreading; corymb mostly few-flowered; pedicels pubescent and glandular; calyx-lobes foliaceous-tipped; fruit globose, 8-12 mm. in diameter; persistent lobes erect.

Frequent in the valleys and mountains. Flowering often nearly the year round.

Family 46. MALACEAE. APPLE FAMILY.

Trees and shrubs with alternate simple or pinnate leaves, the stipules free from the petiole, small and

deciduous. Flowers regular, perfect, racemose, corymbose or solitary. Calyx 5-toothed or 5-lobed, the tube adnate to the ovary. Petals 5, usually clawed. Stamens numerous or rarely few. Ovary 1-5-celled, composed of 1-5 usually united carpels; styles 1-5; ovules 1-2 in each carpel. Fruit a more or less fleshy pome, consisting of the thickened calyx-tube enclosing the bony papery or leathery carpels. Endosperm none; cotyledones fleshy.

Leaves evergreen; carpels 2, free and separating. 1. **HETEROMELES**.
 Leaves deciduous; carpels 5, united and coalescent
 with the fleshy calyx-tube. 2. **AMELANCHIER**.

1. **HETEROMELES** Roem. CHRISTMAS BERRY; TOLLON.

A small evergreen tree or sometimes shrubby, with simple coriaceous toothed leaves and terminal corymbose panicles of small white flowers. Calyx turbinate, 5-parted, the lobes at length inflexed over the carpels and becoming fleshy. Petals rounded, concave. Stamens 10; filaments dilated at base and somewhat connate. Ovary 2-3-celled, 4-6-ovuled; styles 2-3. Fruit a red ovoid berry-like pome; carpels free from the fleshy calyx-tube above the middle.

1. **H. salicifolia** (Presl) Abrams. Usually 3-6 m. high, nascent parts tomentulose; leaves narrowly oblong or oblong-lanceolate, 5-10 cm. long, remotely serrate or dentate, dark green and shining; fruit about 6 mm. long. (*H. arbutifolia*.)

Common in the chaparral belt. May-June.

2. **AMELANCHIER** Medic. SERVICE BERRY.

Shrubs or small trees, with deciduous simple leaves. Flowers racemose, white. Calyx 5 parted, the lobes narrow, persistent, usually reflexed. Petals 5, ascending. Stamens indefinite, usually about 20, the outer the longer. Styles 5; carpels united into a 5-celled ovary, each cell divided into 2 by a dorsal partition. Fruit a small berry-like pome.

1. **A. venulosa** Greene. An erect bushy shrub, 2 m. high or more, with ashy gray bark, and tomentose twigs; leaves broad obovate, entire below the middle, sparsely serrate at the obtuse apex, more or less clothed with a short tomentum; inflorescence

branches and calyx-tube tomentose; calyx-lobes triangular-lanceolate, tomentose on both surfaces, strongly recurved.

Coniferous forests of the San Gabriel and San Bernardino Mountains; Swartout Canyon, San Antonio Mountains.

Family 47. AMYGDALACEAE. PEACH FAMILY.

Trees or shrubs with alternate deciduous or evergreen usually serrate leaves and white or rose-colored flowers in terminal or axillary racemes or corymbs. Calyx campanulate or turbinate, 5-cleft, deciduous. Petals 5, inserted on the calyx, spreading. Stamens 15–25, inserted with the petals. Ovaries 1–5, 1-celled, free; ovules 2, pendulous. Fruit a more or less fleshy drupe with a bony stone; seeds 1 or rarely 2.

Leaves deciduous.

Flowers corymbose or umbellate.

Flowers racemose.

Leaves evergreen; flowers racemose.

1. PRUNUS.

2. PADUS.

3. LAUROCERASUS.

1. PRUNUS L. CHERRIES and PLUMS.

Trees or shrubs, with deciduous leaves. Flowers umbellate or corymbose, appearing before or with the leaves mostly on branches of the previous season. Style terminal. Ovary and fruit smooth and glabrous; the stone smooth or slightly roughened, globose, oval or compressed.

1. *P. emarginata* (Dougl.) Walp. A shrub, 1–4 m. high, with a smooth dull red bark; leaves ovate or oblong-obovate, finely serrate, 2–4 cm. long, on petiole 2–6 mm. long; the blade with 1 or 2 glands at the base; flowers 3–10, in short cymbs; drupes globose, 7–10 mm. long.

Widely distributed over the Pacific Coast ranging from British Columbia to Arizona; Lytle Creek Canyon, also in the San Bernardino and Cuernavaca Mountains. The southern California form has been called *Cerasus arida* Greene.

2. PADUS Mill. CHOKE CHERRY.

Trees or shrubs, with deciduous leaves and small white flowers in narrow racemes terminating leafy branches of the season. Drupe small, globose, the exocarp fleshy, smooth and glabrous; the stone smooth, small, rounded or oval.



1. *P. demissa* (Nutt.) Roem. Shrub, 1–4 m. high; leaves ovate or oblong-ovate, acute or acuminate, rounded or cordate at base, sharply serrate, more or less pubescent beneath, 5–10 cm. long, with 1 or 2 glands at the base of the blade; racemes 5, terminal, 7–10 cm. long, many-flowered; drupe globose, red or purple, astringent; stone globose.

Occasional in the San Bernardino and San Antonio Mountains in the upper portions of the chaparral belt and in the pine belt.

3. LAUROCERASUS Reichb. EVERGREEN CHERRIES.

Trees and shrubs, with alternate coriaceous leaves, persistent into the second season, toothed or entire. Flowers in narrow racemes, arising from the axils of the leaves of the previous season. Calyx with 5 short lobes; petals small, white. Stamens 15–30. Style terminal. Fruit with a large smooth stone and thin scarcely fleshy exocarp.

1. *L. ilicifolia* (Nutt.) Roem. Shrubby or arborescent, 3–6 m. high, bark grayish brown; leaves coriaceous, glossy above, glabrous throughout, ovate to ovate-lanceolate, coarsely spinose-toothed, 2.5–5 cm. long, on short petioles; racemes axillary, 2.5–5 cm. long, leafless; flowers small; drupe 1 cm. long or more, thick, slightly obcompressed, sweetish, scarcely astringent.

Common in the chaparral belt. May–June.

2. *L. lyoni* (Eastw.) Britton. CATALINA CHERRY. This species is closely related to *ilicifolia* and has been considered a mere variety. It differs in the larger ovate-lanceolate leaves, 5–8 cm. long, with entire thickened and revolute margins, those of vigorous shoots and seedlings sparsely spinose; fruit nearly globose, about 2 cm. long.

A small tree, 8–10 m. high, with a trunk sometimes 5 dm. in diameter. Native of the islands off the coast of southern California, and also on the mainland in northern Lower California.

Family 48. MIMOSACEAE. MIMOSA FAMILY.

Herbs, shrubs or trees, with alternate mostly compound leaves, and small regular mostly perfect flowers in heads, spikes or racemes. Calyx 3–6-toothed or lobed, the teeth or lobes usually valvate in the bud. Corolla of as many distinct or more or less united petals. Stamens as many as petals, twice as many or numerous, distinct or monadelphous. Ovary 1-celled; ovules several or numerous; style simple. Fruit a legume. Seeds without endosperm; cotyledons fleshy.

Pods straight or slightly curved.
Pods coiled.

1. PROSOPIS.
2. STROMBOCARPA.

1. *PROSOPIS* L.

Trees or shrubs often armed with axillary spines or spinescent stipules. Leaves bipinnate with 1 or 2 pairs of pinnæ and usually numerous small entire leaflets. Flowers greenish, regular, in cylindric or globose axillary pedunculate spikes. Calyx campanulate, the teeth very short and valvate. Petals 5, valvate, united below the middle or at length free, woolly on the inner side. Stamens 10, free and exserted; anthers tipped with a deciduous gland. Ovary villous; style filiform. Pod linear, compressed or nearly terete, straight, falcate or twisted, coriaceous and indehiscent, usually pulpy within. Seeds numerous, ovate, compressed.

1. *P. glandulosa* Torr. (ALGAROA or MESQUITE.) A shrub or small tree, much branched, the branches widely spreading; spines axillary; petioles glabrous or sparsely puberulent; leaflets 8–12 pairs, the pairs about 1 cm. distant, linear, 12–15 mm. long, 2.5–4.5 mm. wide, sparsely puberulent at least on the margins; spikes nearly sessile, 5–8 cm. long, usually dense; flowers very short-pedicelled, 2 mm. long; pods straight or slightly falcate, only 1–3 developing, 10–15 cm. long, 10–12 mm. wide, longitudinally veiny, on stipes about 5 mm. long, straw-colored and sweetish when mature.

River bottoms about San Bernardino. Common on the Colorado Desert.

2. *STROMBOCARPA* Gray.

Distinguished from *Prosopis* by the tightly coiled pods.

1. *S. pubescens* (Benth.) Gray. (TORNILLA or SCREW-BEAN.) A shrub or small tree resembling the last in habit, more or less puberulent; stipules spinescent; leaflets 5–8 pairs, the pairs 3–5 mm. distant, oblong, 5–8 mm. long, obtuse at apex; spikes on peduncles about 1 cm. long, 4–6 cm. long, often lax; flowers sessile, 3 mm. long, pods usually several-many developing, twisted into a straight cylinder, 25–35 mm. long, about 5 mm. broad, on stipes less than 2 mm. long.

River bottoms about San Bernardino, growing with mesquite.

Family 49. FABACEAE. BEAN FAMILY.

Herbs, shrubs or trees with alternate stipulate compound or rarely entire leaves and irregular or regular flowers. Leaflets mostly entire, the upper sometimes converted into tendrils. Calyx 4–5-lobed or 4–5-cleft, its tube exceeding the perigynous disk, which bears the

petals and stamens. Petals commonly 5 and irregular; the *standard* superior, larger and external, covering in the bud the 2 lateral ones (*wings*), these covering the 2 inferior pair which are more or less united above, forming the *keel*. Stamens and pistils enclosed in the keel. Filaments 10, 9 commonly united below into a sheath about the pistil and 1 distinct (*diadelphous*), or all united (*monadelphous*), or distinct; anthers 2-celled, dehiscent longitudinally. Pistil simple, free, becoming a legume in fruit; ovules few or many on the single parietal placenta; style usually incurved. Legume 1-celled, 2-valved, sometimes falsely 2-celled by the intrusion of the placenta. Endosperm usually wanting. (*Leguminosae.*)

Stamens distinct; shrub; flowers solitary, purple. 1. XYLOTHERMIA.
Stamens diadelphous or monadelphous.

Leaves palmately 5-11-foliate.

Leaves 3-foliate.

Herbage not glandular-dotted.

Herbs.

Flowers in axillary racemes or spikes.

Pods spirally coiled.

Pods small, wrinkled.

Flowers capitate.

Shrub.

Herbage glandular-dotted.

Leaves unequally pinnate; tendrils wanting.

Herbage glandular-dotted.

Shrub; pods not prickly.

Perennial herb; pods prickly.

Herbage not glandular-dotted.

Flowers in spikes or racemes.

Flowers solitary or umbellate.

Pods dehiscent.

Pods indehiscent.

Leaves pinnate; tendrils present.

Style villous all around at apex.

Style villous on 1 side.

2. LUPINUS.

4. MEDICAGO.

5. MELILOTUS.

6. TRIFOLIUM.

3. CYTISUS.

9. PSORALEA.

10. AMORPHA.

12. GLYCYRRHIZA.

11. ASTRAGALUS.

7. HOSACKIA.

8. SYRMATIMUM.

13. VICIA.

14. LATHYRUS.

1. XYLOTHERMIA Greene.

A rigid much branched spinescent shrub with small nearly sessile 1-3-foliate exstipulate leaves and large solitary subsessile purple flowers. Calyx campanulate, repandly 4-toothed. Petals equal; standard orbicular,

the sides reflexed; keel petals distinct, oblong, obtuse. Stamens distinct. Pod linear, compressed, straight, several-seeded.

1. **X. montana** (Nutt.) Greene. Shrub 1–2 m. high, the branches widely spreading; leaves crowded; leaflets 6–18 mm. long, oblanceolate, acute, entire, somewhat silky-pubescent when young; flowers near the ends of the stiff spinescent branchlets, on short 2-bracteolate peduncles, rose-colored or purple, 15–20 mm. long. (*Pickeringia montana* Nutt.)

Occasional in the chaparral belt throughout our range.

2. LUPINUS L. LUPINE.

Annual or perennial herbs or woody plants, with palmately 5–15-foliate leaves and adnate mostly inconspicuous stipules. Leaflets entire. Flowers in terminal racemes, verticillate or scattered. Calyx deeply bilabiate; upper lip notched; lower entire or sometimes 3-toothed or 3-cleft. Standard broad, the sides reflexed; wings united above, enclosing the incurved beaked keel. Stamens monadelphous, dimorphous; 5 anthers oblong, basifixed, the other 5 rounded, versatile. Stigma bearded. Pod 2-valved, compressed, straight.

Ovules several in each pod; annuals.

Flowers not verticillate.

Herbage sparsely to densely pubescent or villous.

Herbage finely and sparsely pubescent, becoming almost glabrous.

Herbage densely villous or pilose.

Keel ciliate toward the base.

Keel naked.

Leaves oblanceolate; petals 8 mm. long.

Leaves cuneate-obovate; petals 6 mm. long.

Herbage hispid with viscid stinging hairs.

Flowers verticillate.

Keel ciliate; petals 4 mm. long.

Keel naked; petals 10–12 mm. long.

Perennials.

Herbaceous.

Herbage nearly glabrous; keel ciliate.

Herbage silky-pubescent; keel naked.

Suffrutescent or shrubby.

Keel ciliate.

Lower calyx-lobe entire; seeds dark.

Lower calyx-lobe 3-toothed; seeds

1. *L. truncatus*.

2. *L. sparsiflorus*.

3. *L. concinnus*.

4. *L. agardhianus*.

5. *L. hirsutissimus*.

6. *L. micranthus*.

7. *L. affinis*.

8. *L. cytisoides*.

9. *L. formosus*.

10. *L. longifolius*.

light-colored and mottled.

Shrub usually about 1 m. high,
with a well developed trunk. 11. *L. hallii*.

Flowering branches arising from
a woody caudex. 12. *L. grayi*.

Keel naked; maritime species. 13. *L. chamissonis*.

1. *L. truncatus* Nutt. Usually rather stout, sparingly branched, 3-6 dm. high, finely and sparsely pubescent, becoming nearly glabrous; leaflets 5-7, linear-cuneiform, apex truncate, entire or 3-toothed, 2-4 cm. long, scarcely equaling the petiole; upper calyx lip 2-cleft; petals deep purple, 8-10 mm. long; the standard shorter; keel 2-3 mm. long.

Common in the open foothills and valleys. March-May.

2. *L. sparsiflorus* Benth. Slender, sparingly branched, 3-6 dm. high, villous with spreading hairs; leaflets 5-9, linear, obtuse at apex, 1-2.5 cm. long; petioles 2-4 times longer; upper calyx-lip 2-parted; petals violet, 10 mm. long; standard shorter; keel ciliate on the claws and on the lower $\frac{1}{4}$ of the blade; pod 1-2.5 cm. long.

Frequent in the foothills. March-May.

3. *L. concinnus* Agardh. Low, 10-15 cm. high, spreading, densely villous or hirsute; leaflets 5-8, oblanceolate, 10-20 mm. long, obtuse; petioles slender, 2-4 times longer; racemes short, dense, subsessile; bracts linear-setaceous persistent; upper calyx-lip 2-parted, lower deeply trifid; petals 8 mm. long, violet; standard shorter with a yellow spot in the center; keel scarcely falcate, naked, slightly exceeding the wings; pod 4-seeded.

Occasional in dry washes in the interior valleys.

4. *L. agardhianus* Heller. Low, slender, 6-15 cm. high, spreading, rather densely pilose; leaflets 5-7, cuneate-obovate, 6-12 mm. long; racemes short, lax; bracts short; upper calyx-lip bifid, lower 3-toothed; petals 6 mm. long, blue and white; standard shorter; keel slightly exceeding the wings, nearly straight, naked; pod 1 cm. long. (*L. gracilis* Agardh.)

San Fernando Mountains, near Chatsworth Park. April.

5. *L. hirsutissimus* Benth. Rather stout, 2-3 dm. high, very hispid with viscid stinging hairs; leaflets 5-7, broadly cuneate-obovate, retuse, obtuse, or rarely acute, mucronulate, 1.5-3 cm. long; petioles twice as long; racemes loose; upper calyx-lip deeply cleft; petals reddish purple, nearly equal, 12 mm. long; keel ciliate on the claw only; pod hirsute, 2.5 cm. long.

Frequent in the foothills and interior valleys, mostly in sandy soil. March-May.

6. *L. micranthus* Dougl. Rather slender and weak, branched from the base, 12-20 cm. high, pilose-pubescent, not at all succulent; leaflets 5-7, narrowly linear to linear-spatulate, 1-3 cm. long; petioles twice as long; racemes pedunculate; verticils 3-5, often indistinct; pedicels 3 mm. long or in fruit 6 mm. long; upper calyx-lip 2-cleft, the lobes divergent, lower longer, entire; petals 4 mm. long, blue except the white and dotted middle of the erect

mucronulate standard; keel woolly-ciliate above the middle; pods 5-seeded.

Common in all our valleys. March-May.

7. *L. affinis* Agardh. Stout and succulent, branching above, 3-6 dm. high, nearly glabrous or somewhat short pubescent; leaflets 7, cuneate-obovate, obtuse or emarginate, 2.5-4 cm. long; petioles 2 or 3 times as long; racemes with 3-7 whorls; bracts equaling the calyx; upper calyx-lip bifid, lower entire or 3-toothed; petals 10-12 mm. long, bluish-purple; keel broad, naked.

9. *L. cytisoides* Agardh. Taller than the last, 1-2 m. high; stems striate; pubescence minute, appressed; stipules lanceolate-subulate; leaflets 7-9, oblanceolate, 5 cm. long or more; raceme much elongated, dense; flowers not verticillate; calyx as in the last; petals usually rose-purple, 12-14 mm. long; keel strongly falcate, densely ciliate below the middle.

Frequent in the canyons of the San Gabriel and San Bernardino Mountains. April-August.

10. *L. longifolius* (Wats.) Abrams. Shrubby, 8-15 dm. high, often from a trunk-like base and much branched above; petioles 5-10 cm. long; leaflets 7-9, oblanceolate, 5 cm. long or less, somewhat canescent with appressed pubescence on both sides; racemes rather loosely flowered, 15-25 dm. long; flowers verticillate, 12-15 mm. long, deep blue or nearly white; upper calyx-lip deeply cleft, the lower entire; standard with a whitish spot near the middle, changing to rose-purple; keel ciliate above the middle to near the tip, the claw naked; seeds oval, 4 mm. long, brownish. (*L. chamissonis longifolius* Wats.)

Frequent on bluffs along the seashore, but not on the dunes.

11. *L. hallii* Abrams. Shrubby, 6-10 dm. high, canescent throughout with a short silky pubescence; leaflets 7-9, spatulate, 12-24 mm. long; flowers in whorls 2-3 cm. distant; bracts ovate-lanceolate, acuminate, caducous, 7 mm. long; upper calyx-lobe 2-lobed, the lower 3-toothed; keel conspicuously ciliate on the central part of the inner margin.

Nowhere abundant, but widely distributed through the chaparral belt and on open hillsides in southern California. Closely related to the northern *L. albifrons* Benth.

12. *L. grayi* Wats. Stems decumbent or ascending from a woody branching caudex, 3-6 dm. high, densely silky pubescent throughout; leaflets 5-9, cuneate-oblong, 1.5-3.5 cm. long; flowers verticillate, 12-15 mm. long, deep blue; standard with a permanent yellow spot in center; keel ciliate from near the apex to the base and on the claw.

Frequent in open pine forests in the San Gabriel, San Bernardino and Cuyamaca Mountains.

13. *L. chamissonis* Esch. Shrubby, 4-8 dm. high, forming rather dense tufts, leafy throughout; leaflets usually 9, cuneate-obovate, obtuse and mucronulate or acute, 1-3 cm. long, very silky on both sides; racemes rather dense, mostly on short peduncles; flowers subverticillate, 10-12 mm. long; upper calyx-lip cleft, lower

entire; petals blue or lavender; standard with permanent yellow spot; keel naked.

Common on the sand-dunes along the seashore. Flowering nearly the year round.

3. CYTISUS L. BROOM.

Shrubs with green, leafy or sometimes nearly leafless, more or less angular branches. Leaves palmately or pinnately 3-foliate; leaflets entire. Flowers solitary or racemose, usually yellow. Calyx bilabiate. Petals broad; keel obtuse. Stamens monadelphous. Pod compressed, several-seeded.

1. *C. canariensis* (L.) Link. Much branched, 1–2 m. high, soft pubescent, leafy; leaflets 6–12 mm. long; flowers yellow, 15–20 mm. long, fragrant, in terminal racemes; upper calyx-lip deeply 3-toothed, the lower slightly so.

An occasional escape from cultivation. A native of the Old World.

4. MEDICAGO L.

Annual or perennial herbs with pinnately 3-foliate leaves and 2–3 or many flowers in axillary peduncles. Stipules adnate, often laciniate. Petals free from the diadelphous stamens, deciduous. Pod 1–several-seeded, coiled into a spiral.

Flowers purple.

1. *M. sativa*.

Flowers yellow.

Leaves glabrous or nearly so; flowers in axillary 2–3-flowered clusters.

Bur-like pods with hooked prickles.

2. *M. hispida*.

Bur-like pods unarmed, or with tubercles on the margin.

Pod 3–5 mm. broad.

3. *M. apiculata*.

Pod 10 mm. broad, strongly veiny.

4. *M. orbicularis*.

Leaves pilose-pubescent; flowers in axillary pedunculate spikes.

5. *M. lupulina*.

1. *M. sativa* L. (ALFALFA.) Stems erect from a deep perennial tap-root, glabrous, 5–10 dm. high; leaflets cuneate-oblong to ob-lanceolate, toothed above; flowers many in a short raceme, violet; pod spirally coiled, unarmed.

An occasional escape. Native of Europe.

2. *M. hispida* Gaertn. (BUR-CLOVER.) Slender, much branched, decumbent, glabrous annual; leaflets obovate to obcordate, toothed above; flowers small, yellow, 2–3 or rarely more on axillary peduncles; pods coiled, their margins armed with hooked prickles.

Everywhere common. Native of Europe.

3. *M. apiculata* Willd. Stems branched from the base, spreading, 3-6 dm. long; leaflets deltoid, 10-12 mm. long, denticulate except near the base; pod spirally coiled; 3-5 mm. broad, unarmed, strongly reticulated, the reticulations extending to the edge and appearing as a row of tubercles on either side of the margin.

Occasional in lawns, Los Angeles; Pasadena. Native of Europe.

4. *M. orbicularis* All. Much branched and spreading; leaves obcordate, denticulate above; stipules laciniate; peduncles 1-2-flowered; pods coiled, unarmed, veiny, about 1 cm. broad.

This species, a native of southern Europe, was collected in a field near Santa Ana by Helen D. Geis in 1902. We are not aware that it has been reported from any other locality in North America.

5. *M. lupulina* L. More or less pilose-pubescent; stems pro-cumbent or ascending, 2-4 dm. long, from a perennial taproot; leaflets broadly obovate, denticulate above; flowers in short spikes on slender peduncles, yellow, scarcely 2 mm. long; legume 1-seeded, smooth, reniform, the acuminate tip coiled.

Glenn Ranch, Lytle Creek. Native of Europe.

5. MELILOTUS L. SWEET CLOVER.

Erect annual or biennial herbs with pinnately 3-foliate leaves, the leaflets serrulate. Stipules adnate. Flowers small in slender pedunculate racemes. Petals free from the diadelphous stamens, deciduous. Pod ovoid, small, scarcely dehiscent, 1-2-seeded.

1. *M. indica* (L.) All. Annual; glabrous, erect, 3-20 dm. high, branching; leaflets mostly cuneate-oblong, obtuse, denticulate, 2.5 cm. long or less; racemes many, bearing small, nearly sessile, yellow flowers.

Common in damp ground. Native of Europe.

2. *M. alba* Lam. Annual; glabrous, erect, 6-20 dm. high, branching; leaflets truncate; racemes many, elongated; flowers white, the standard exceeding the other petals.

Habitat of the last and as generally distributed but much less common. Native of Europe.

6. TRIFOLIUM L. CLOVER.

Annual or perennial herbs with palmately 3-foliate leaves. Leaflets usually denticulate. Stipules adnate. Flowers in capitate racemes, spikes or umbels, rarely few or solitary, on more or less elongated axillary or terminal peduncles. Calyx 5-cleft with nearly equal teeth, persistent. Petals persistent, all more or less adnate to the staminal tube by their claws, or the standard sometimes free: wings narrow; keel mostly obtuse. Stamens diadelphous. Pods membranous, shorter or

slightly exceeding the calyx, 1-6-seeded, dehiscent or indehiscent.

Heads not involucrate.

Calyx-teeth not plumose.

Annuals; corolla purple or rose color.

Calyx-teeth not ciliate.

Calyx glabrous.

Calyx sparsely villous.

Calyx-teeth ciliate.

Perennials; corolla white.

Calyx-teeth plumose.

Heads involucrate.

Flowers not inflated.

Involucre flat.

Perennial.

Annuals.

Herbage glabrous.

Calyx-teeth more or less distinctly 3-toothed.

Calyx-teeth entire.

Herbage pubescent, the pubescence clammy and acid.

Involucre cup-shaped.

Flowers becoming inflated.

Involucral bracts conspicuous.

Heads 2 cm. broad or more, ochroleucous.

Heads 1 cm. broad or less, purple.

Involucre reduced to a mere ring of very short truncate bracts.

1. *T. gracilentum*.

2. *T. bifidum*.

3. *T. ciliolatum*.

4. *T. repens*.

5. *T. albobpurpureum*.

6. *T. wormskjoldii*.

7. *T. tridentatum*.

8. *T. variegatum*.

9. *T. obtusiflorum*.

10. *T. microcephalum*.

11. *T. furcatum*.

12. *T. stenophyllum*.

13. *T. depauperatum*.

1. ***T. gracilentum*** T. & G. Erect, slender, 2-5 dm. high, glabrous or peduncles and calyx sparsely villous; stipules lanceolate; leaflets cuneate-obcordate, serrulate, 1 cm. long; heads 15-25-flowered; calyx-teeth lanceolate-subulate, setaceously acuminate, 3 times the length of the tube; petals slightly exceeding the calyx-teeth, purple or rose color; pods exserted, 2-seeded.

Common throughout our range on the plains and grassy hills. March-April.

2. ***T. bifidum*** Gray. Erect, very slender, pale green or glaucous; peduncles and calyx more or less villous; stipules ovate-lanceolate, entire; leaflets linear-cuneate, the sides remotely toothed, apex bifid and mucronulate; heads 6-15-flowered; calyx-teeth subulate-setaceous, about equaling the minute pale rose-colored corolla; pod included, 1-seeded.

Morgans Station, *Davidson*.

3. ***T. ciliolatum*** Benth. Erect, 2-6 dm. high, glabrous; stipules narrow, acuminate; leaflets cuneate-oblong or obovate, 1-2 cm. long, obtuse or retuse, serrulate; calyx-teeth lanceolate, very acute, rigidly ciliate; corolla slightly exceeding the calyx, purple. (*T. ciliatum* Nutt.)

Common on grassy hillsides and in the valleys.

4. **T. repens** L. Perennial, diffuse, creeping, with erect long-stalked leaves and heads; leaflets obcordate, denticulate; calyx-teeth unequal, lanceolate-subulate, shorter than the tube; corolla white; pods usually 4-seeded.

The white clover of lawns, occasionally appearing as an escape.

5. **T. albopurpureum** T. & G. Much branched, ascending or erect, 1-4 dm. high; stipules ovate to lanceolate; leaflets cuneate-oblong, obtuse, denticulate above the middle, 12-20 mm. long; heads long-peduncled, ovate; calyx-teeth longer than the tube, slender, plumose, equaling the small white-tipped purple corolla.

Frequent on the plains and grassy hills. March-April.

6. **T. wormskjoldii** Lehm. Perennial, spreading underground by slender rootstocks; stems decumbent, often 3 dm. long or more; herbage flaccid, glabrous; stipules lanceolate-acuminate, laciniately toothed; leaflets obovate-oblong, obtuse, pectinate-denticulate, 2 cm. long or more; involucre 1-2 cm. broad, laciniate-aristate; calyx-tube scarious, 10-striate; teeth linear-subulate, much longer than the tube, all entire or 1 or more setaceously 2-3-parted; standard deeply emarginate, pale purple, the other petals darker. (*T. involucreatum* of Bot. Cal. in part.)

Frequent in low ground in the valleys, also in mountain meadows.

7. **T. tidentatum** Lindl. Annual; erect, 2-4 dm. high, glabrous; stipules setaceously lacinate; leaflets linear or lanceolate, sharply serrate, 2-6 cm. long; head 2-3 cm. broad; involucre lacinate, much shorter than the flowers; flowers about 1 cm. long, bright purple with darker center; tip of standard sometimes whitish; calyx-tube 10-nerved; the teeth rigid, broad at base, abruptly narrowed to a subulate spinulose-tipped apex which is usually subtended by a short stout tooth on each side.

Frequent on the plains and grassy hillsides. Very variable as to foliage. March-April.

8. **T. variegatum** Nutt. Annual; glabrous, decumbent or prostrate with many slender branches; [stipules laciniately cleft; peduncles slender, longer than the leaves; leaflets of the lower leaves obcordate, those of the upper obovate-oblong, minutely spinulose-serrate; involucre lacinate, shorter than the 3-15-flowered heads; calyx-tube 15-nerved; teeth broadly subulate, tapering to a setaceous point, longer than the tube; corolla exceeding the calyx, purple and whitish-tipped.

Frequent in grassy openings in the San Gabriel and San Bernardino Mountains, confined mostly to the pine belt.

9. **T. obtusiflorum** Hook. Annual; stems stout, erect, flexuose, purple, with ascending branches; leaves dull green, soft pubescent throughout and very clammy, acidulous; stipules spreading or reflexed; leaflets 2-3 cm. long, linear-lanceolate, pectinately setulose; heads 2-3 cm. broad on long peduncles; calyx-tube with 10 prominent and as many lesser nerves; corolla whitish with a dark purple center.

Occasional on moist shady slopes and along streams in all our mountains, confined mostly to the chaparral belt.

10. *T. microcephalum* Pursh. Annual; slender, much branched, decumbent, soft pubescent; stipules ovate-acuminate, nearly entire; leaflets obovate-cuneiform or obcordate, denticulate; heads small, subglobose, many-flowered, on slender peduncles; involucre many-cleft, the segments entire; calyx-teeth subulate, broad, scarious and sometimes toothed at base; corolla minute, pinkish; pod globose, 1-seeded.

Common in the foothills and mountains in open places. April-August.

11. *T. furcatum* Lindl. Usually stout and fistulose, branching from near the base, decumbent, 3-6 dm. long; herbage light green, glabrous and somewhat succulent; stipules large, membranous, nearly or quite entire; leaflets 1-3 cm. long, broadly obovate, obtuse or retuse, dentate or spinulose-denticulate; peduncles stout, much exceeding the leaves; involucre bracts connate at base, ovate-lanceolate, acuminate, scarious-margined, heads hemispheric, 2-4 cm. broad; calyx-teeth short, entire and unequal; corolla 1-2 cm. long, ochroleucous or somewhat reddish tinged; pod stipitate, 3-8-seeded; seed rounded, minutely granulate.

Occasional on grassy hillsides in rather heavy soil. Elysian Park, Davidson; Chatsworth Park.

12. *T. stenophyllum* Nutt. Diffuse annual with slender stems and branches, often purplish, decumbent or ascending, 1-3 dm. long; leaflets linear, remotely serrate-toothed; peduncles filiform, much longer than the leaves; segments of the involucre oblong, cuneate at the base; head small, hemispheric; corolla purple, inflated from a narrow base to a broad, almost truncate apex; pod 2-seeded; seeds obliquely heart-shaped, strongly rugose.

Frequent on grassy slopes. March.

13. *T. depauperatum* Desv. Low, diffuse, glabrous, annual, branching from the base, decumbent, flaccid, 6-15 cm. long, few-leaved; leaflets 1 cm. long, cuneate-oblong, obtuse or emarginate, denticulate; head long-peduncled, few-flowered; involucre much reduced, with truncate short lobes; corolla less inflated, not at all truncate at apex; pod 1-2-seeded; seeds somewhat angular, tuberculate-rugose.

Same range as the last and much resembling it, but easily distinguished by the involucre.

7. *HOSACKIA* Dougl.

Annual or perennial herbs with pinnately 3-many foliate leaves, and minute gland-like or scarious stipules. Flowers solitary or umbellate, naked or subtended by 1-5-foliate bracts, sessile or on axillary peduncles. Calyx about equally 5-toothed or 5-cleft. Petals free from the stamens, nearly equal; standard ovate or rounded, the claw often remote from the others; wings obovate or oblong; keel slightly incurved, obtuse or

acutely beaked; stamens diadelphous. Style incurved. Pod linear, compressed or nearly terete, dehiscent, several-many-seeded. This American genus has been combined by some authors with the old world genus *Lotus*.

Stipules scarious; perennials.

Flowers whitish with purple marks; leaves thick, glaucous.

1. *H. crassifolia*.

Flowers yellow; leaves thin, appressed-pubescent.

Leaflets 7-11; flowers 5-7, 15 mm. long.

2. *H. oblongifolia*.

Leaflets 5-7; flowers 1-3, 10 mm. long.

3. *H. lathyroides*.

Stipules gland-like; annuals except *grandiflora*.

Leaflets 1-3, on a terete rachis.

4. *H. americana*.

Leaflets more than 3, on a dilated rachis.

Flowers solitary in the axils, bractless.

Calyx-teeth equaling the tube.

5. *H. wrangeliana*.

Calyx-teeth much longer than the tube.

6. *H. brachycarpa*.

Flowers terminating few-many-flowered peduncles, usually bracted.

Annuals.

Pods constricted between the seeds; keel acute, sharply curved.

7. *H. parviflora*.

Pods not constricted; keel obtuse, scarcely or not at all curved.

Peduncles 2-5-flowered; seeds smooth and shining.

8. *H. maritima*.

Peduncles 1-2-flowered; seeds quadrate, minutely tuberculate.

Pubescence more or less appressed.

Flowers 9-12 mm. long.

9. *H. strigosa*.

Flowers 4-5 mm. long.

10. *H. rubella*.

Pubescence spreading and more dense.

11. *H. nudiflora*.

Perennial; flowers capitate, 15 mm. long or more.

12. *H. grandiflora*.

1. *H. crassifolia* Benth. Erect, stout, usually simple below, 5-10 dm. high; branches few, often flexuous; leaves 10 cm. long or more, the leaflets rhomboidal, 18-24 mm. long, thick, on short stalks; stipules scarious, ovate or rounded; peduncles shorter than the leaves, bracted above the middle with a 3-foliate petioled leaf; umbel 7-12-flowered; calyx 5 mm. long, on slender pedicels, the teeth very short, acute; corolla greenish yellow or whitish with purple spots, twice as long as the calyx; pods terete, 5-6 cm. long, 4-6 mm. thick, 7-12-seeded; seeds about 4 mm. long.

Open coniferous forests in dry situations, San Gabriel, and San Bernardino Mountains.

2. *H. oblongifolia* (Benth.) Greene. Erect, slender, 3–4 dm. high, somewhat appressed-pubescent; leaflets 7–11, narrowly oblong or oblanceolate, 2.5–3 cm. long, acute; stipules small, acute; peduncles exceeding the leaves, 5–7-flowered; bract subsessile, 1–3-foliate; flowers 15 mm. long; calyx-teeth subulate, nearly equaling the tube; corolla yellow, turning purplish or brownish; pod slender, 5 cm. long.

Occasional along mountain streams.

3. *H. lathyroides* D. & H. Slender, branching and somewhat flexuose, 2.5–4 dm. high, minutely pubescent; leaflets 5–7, linear-lanceolate, acute at both ends; stipules triangular, 2 mm. long, scarious, ovate-acuminate; umbels 1–3-flowered, with or without a linear-lanceolate bract; flowers 10 mm. long; calyx-teeth linear, acute; pod as in the last.

Along streams near Los Angeles and in San Gabriel Canyon.

4. *H. americana* (Nutt.) Piper. Annual; erect or decumbent, 2–6 dm. high, more or less villous; leaflets 1–3 or rarely 5, ovate to oblong, acutish, 12–15 mm. long; peduncles slender, exceeding the leaves; bracts 6–12 mm. long; flowers solitary, salmon-colored or often whitish; calyx-tube short; the teeth linear, equaling the corolla; pod 2–3 cm. long; seeds oblong, smooth, dark-colored. (*H. purshiana* Benth.)

Frequent in the foothills and mountains. June–September.

5. *H. wrangeliana* G. Don. Annual; much branched, decumbent or ascending, 1–3 dm. long; sparsely or canescently villous, leafy; leaflets usually 4, cuneate-obovate to oblong, 6–12 mm. long; calyx-teeth broadly subulate, equaling the tube; corolla 6 mm. long, yellow; standard broadly ovate, erect; pod pubescent, straight, 14–20 mm. long, 5–7-seeded.

Frequent on dry hillsides and plains. March–May.

6. *H. brachycarpa* Benth. Much resembling depauperate forms of the last but more diffuse; herbage soft villous; flowers nearly sessile, yellow; calyx-teeth linear, much longer than the tube; pod oblong, 1 cm. long, pilose, 2–3-seeded. (*Lotus humistratus* Greene.)

Habitat of the last and as generally distributed, but less common.

7. *H. parviflora* Benth. Erect, slender, 5–20 cm. high, glabrous; leaflets 3–5, obovate and small to narrowly oblong and 12–16 mm. long; peduncles filiform; bracts 1–3-foliate; flowers 4 mm. long or less, yellow, turning reddish; keel sharply incurved at apex, about equaling the wings; blade of standard cordate; pod 2.5 cm. long, compressed, constricted between the seeds; seeds oval or roundish, slightly compressed, smooth. (*Lotus micranthus* Benth.)

Santa Monica and Santa Ana Mountains in open grassy places. Not common. April–June.

8. *H. maritima* Nutt. Ascending or decumbent, minutely strigose or nearly glabrous, somewhat succulent, the branches 2–4 dm. long; leaflets 4–6, obovate, obtuse, 8–12 mm. long; peduncles about equaling the leaves, 1–4-flowered; bracts 1–3-foliate or sometimes wanting; flowers yellow, 6–8 mm. long; calyx-teeth linear-subulate, about equaling the tube; standard and wings equaling the

straight keel; pod scarcely compressed, 2–3 cm. long, 10–20-seeded; seeds obliquely oval, smooth. (*Lotus salsuginosus* Greene.)

In moist places on the plains and in the canyons of the foothills. March–May.

9. *H. rubella* Nutt. Slender, prostrate, strigose-pubescent, or nearly glabrous, not at all succulent; leaflets 6–10, linear-oblong, mostly acutish; early peduncles shorter than the leaves, bractless, 1-flowered, the later bracted, 2-flowered; corolla usually reddish, 4–5 mm. long; pod straight or slightly curved at tip, less than 2 mm. broad, 2.5 cm. long, 1–10-seeded; seeds quadrate, minutely granulate, 1 mm. long or usually less, light tawny.

Common in sandy soil along the coast. March–April.

10. *H. strigosa* Nutt. Strigose-pubescent, decumbent or prostrate; peduncles usually somewhat exceeding the leaves, 2-flowered and 3-foliolate-bracted; flowers 9–12 mm. long, yellow; pod pubescent, slightly curved upward, 2–3 cm. long, 2.5 mm. broad; seeds quadrate, more or less notched at both ends as well as at the hilum, rugose and faintly tuberculate, mostly olive-green.

Very common in open grassy places both on the plains and foothills below 2000 feet. March–May.

11. *H. nudiflora* Nutt. Strigose-pubescent, decumbent or ascending; leaves shorter and broader than in the last; peduncles exceeding the leaves, usually 2-flowered and 3-foliolate-bracted; flowers yellow, 8–10 mm. long, 3 mm. broad; seeds quadrate, seldom notched except at hilum, 2 mm. broad, strongly mottled with black.

Occasional in open stony places in the San Gabriel Mountains.

12. *H. grandiflora* Benth. Perennial; erect, 3–10 dm. high or more, slender, with few leaves and long internodes, nearly glabrous, or somewhat silky-pubescent; leaflets 5–7 on an elongated rachis, obovate to oblanceolate, 12–18 mm. long, acutish; peduncles slender, elongated, small-bracted, 5–8-flowered; flowers 2 cm. long, deep yellow, turning orange; calyx half as long; the subulate teeth nearly equaling the tube; pod slender, elongated, glabrous.

Rustic Canyon, near Santa Monica, *Hasse*.

8. SYRMATIUM Vogel.

Herbaceous or suffrutescent perennials with odd-pinnate leaves. Flowers in sessile or pedunculate umbels, the umbels bracted or bractless. Closely related to *Hosackia*, but the pods indehiscent, more or less attenuate into the style, and often arcuate. This genus was included under *Lotus* in the first edition.

Umbels bracted.

Calyx-teeth as long as the tube.

Flowers less than 5 mm. long; pubescence tomentose.

Flowers more than 5 mm. long; pubescence silvery.

1. *S. heermanni*.

2. *S. ornithopum*.

Calyx-teeth half as long as the tube or less.

Leaves silvery-pubescent.

Umbels sessile or short-peduncled. 3. *S. argophyllum*.

Umbels on peduncles longer than the leaves. 4. *S. davidsoni*.

Leaves finely pubescent, but green and not at all silvery. 5. *S. traskiae*.

Umbels bractless.

Plants silvery-pubescent. 6. *S. sericeum*.

Plants not silvery.

Umbels sessile. 7. *S. glabrum*.

Umbels pedunculate. 8. *S. dendroideum*.

1. *S. heermanni* (D. & H.) Greene. Branches numerous, flexuose, weak and prostrate, 3-10 dm. long; pubescence spreading and slightly tomentose; leaflets 5-7, obovate or cuneate-oblong, 4-8 mm. long; umbels on short peduncles or sessile; flowers less than 5 mm. long; calyx half as long, somewhat villous; the teeth filiform, about equaling the tube.

Canyons of the San Gabriel and Santa Ana Mountains, below 4000 feet.

2. *S. ornithopum* Greene. Perennial from a woody base; stems 3 dm. high, densely silky throughout, the branches many, rigid, ascending; leaves 12-24 mm. long; leaflets 4-7, 7-12 mm. long, oblong, acute at both ends; umbels numerous, on peduncles longer than the leaves, single-bracted, many-flowered; flowers 8-9 mm. long; calyx 4-5 mm. long, the teeth about equaling the tube, subulate; pod 2-3-seeded, long-rostrate, strongly curved upward.

Mainly an insular species, found on Santa Barbara, San Nicholas, Santa Catalina, San Clemente and Guadalupe Islands, also on the mainland in Lower California.

3. *S. argophyllum* (Gray) Greene. Densely silvery-silky throughout; stems herbaceous, decumbent or ascending, 3-6 dm. long; leaflets 3-7, obovate and rounded, or oblong and acute, 5-12 mm. long; umbels dense, capitate, on short simple bracted peduncles; flowers 8-10 mm. long; calyx half as long; the teeth filiform, nearly as long as the tube, silky.

In the pine belt of the San Gabriel and San Bernardino Mountains.

4. *S. davidsoni* Greene. Suffrutescent at the very base, the slender branches 3-6 dm. long, prostrate or decumbent, only sparsely leafy, floriferous chiefly near the ends; herbage canescent with an appressed silky pubescence; leaflets 3-5, cuneate-obovate, obtuse or acutish, 4-8 mm. long; umbel unifoliate-bracted, many-flowered, on a slender peduncle, 2.5 cm. long or less, usually exceeding the leaves; calyx-tube 2 mm. long; the teeth slender, 1 mm. long; corolla about 6 mm. long, sulphur-yellow, becoming deep red in age; pod strongly arcuate.

Wilson's Peak, where it was first collected by Davidson. This species is very close to *S. argophyllum* and may be only a form of it. May-July.

5. *S. traskiae* Eastw. (in herb.). Stems suffrutescent, erect, 4–18 dm. high, the branches appearing 2-ranked, pubescent at the tips with short white hairs, becoming nearly glabrous; leaflets 3–4, usually 3, 8–12 mm. long, linear, acute at both ends, on an elongated finely pubescent rachis; umbels on slender peduncles shorter than the leaves, with a linear bract, 2–5-flowered; flowers 1 cm. long; calyx 5 mm. long, scantily pubescent, the teeth short, pointed; corolla yellow; pod 3–4 cm. long, very slender, with a short very slender tip, thinly pubescent.

This species is related to *S. distichum* Greene, but differs in the more elongated leaf-rachis, linear leaflets, nearly glabrous instead of silky-canescant, and yellow instead of reddish flowers. It is found on Santa Catalina and San Clemente Islands. The type (United States National Herbarium no. 469581) was collected at Mosquito Harbor, San Clemente Island, *Trask* 287. For the description of this species and for valuable notes on the genus, I am indebted to one of my students, Mr. Ralph Noddin.

6. *S. sericeum* (Benth.) Greene. Slender, 3–6 dm. high, much branched and ascending, having the habit of *glabrum*, but silvery canescent with a close short silky pubescence; leaflets 3, cuneate-oblong to linear, 12–15 mm. long; umbels few-flowered, sessile or short-peduncled; flowers 6 mm. long; calyx half as long, with short slender teeth.

San Gabriel Mountains, *Davidson*; also in the Liebre, and Tehachipi Mountains.

7. *S. glabrum* (Torr.) Greene. Suffrutescent, tufted and reedy, 5–10 dm. high, erect or decumbent, nearly glabrous; leaflets mostly 3, oblong to linear-oblong, 6–12 mm. long, obtuse or acute; umbels numerous, sessile; flowers 6–8 mm. long, yellow, turning reddish; calyx 3–5 mm. long; the teeth subulate, erect, slightly less than half as long as the tube. (*H. glabra* Torr.)

Common throughout our range in dry places below 3000 feet. Flowering nearly the year round.

8. *S. dendroideum* Greene. Shrubby, the stems erect, 2–5 cm. thick, the branches numerous, short, their tips densely silky-pubescent; leaflets 3–5, on a dilated rachis, 4–8 mm. long, oblong, obtuse; umbels on peduncles shorter than the leaves, bractless, many-flowered; flowers 7–8 mm. long; calyx 4 mm. long, densely pubescent, the teeth short and blunt, hairy; pod 2-seeded, 11 mm. long, slightly curved with a short tip.

An insular species found from Santa Cruz Island to Santa Catalina.

9. PSORALEA L.

Punctate with dots and heavy-scented perennial herbs or rarely shrubby. Stipules free from the petiole. Leaves pinnately 3-foliolate or rarely palmately 3–5-foliolate. Calyx-lobes nearly equal, the upper often connate. Keel united with the wings, broad and obtuse above. Stamens diadelphous or monadelphous; anthers all alike. Pod ovate, indehiscent, 1-seeded.

Leaves pinnately 3-foliolate.

Stems erect.

Peduncles much exceeding the leaves.

Peduncles about equaling the leaves.

Stems prostrate.

Leaves palmately 5-foliolate.

1. *P. macrostachya*.

2. *P. physodes*.

3. *P. orbicularis*.

4. *P. californica*.

1. *P. macrostachya* DC. Simple or more or less branched, 1-4 m. high, nearly glabrous, puberulent or often somewhat tomentose; stipules small, lanceolate; leaflets ovate-lanceolate, 3-5 cm. long; peduncles much exceeding the leaves; spikes cylindric, silky-villous; bracts broad, acuminate, equaling the flowers; lower calyx-tooth longest, about equaling the corolla; tenth stamen nearly free; pod villous, ovate-oblong, acute, compressed, 6-8 mm. long.

Along streams in the foothills and in the valleys. June-August.

2. *P. physodes* Dougl. Slender, erect, 3-6 dm. high, nearly glabrous; stipules linear-lanceolate; leaflets ovate, acute, 2-3 cm. long; peduncles about equaling the leaves; racemes short, dense; bracts small; calyx with sessile glands and somewhat villous with black hairs, becoming enlarged and inflated in fruit; teeth short, nearly equal; corolla 1 cm. long, twice as long as the calyx, ochroleucous, often with a deep purple tinge; stamens monadelphous; pod rounded, compressed, 6 mm. long.

Frequent in the upper chaparral belt throughout our range.

3. *P. orbicularis* Lindl. Stem prostrate, creeping, the leaves and racemes erect, long stalked; leaflets 2.5-4 cm. long, the terminal one nearly orbicular, the lateral pair obovate; raceme often 2 dm. long; bracts large, deciduous; calyx villous and pedicellate-glandular, cleft nearly to the base, the lower tooth equaling the purplish corolla; stamens diadelphous; pod ovate, acute, 6 mm. long.

Occasional in the valleys throughout our range; rare in the coast region.

4. *P. californica* Wats. Low, tufted; pubescence short, silky, appressed; stipules scarious, lanceolate, deciduous; leaflets broadly lanceolate, acutish, 2-4 cm. long; peduncles short; racemes rather loose, shorter than the leaves; pedicels slender; calyx silky-villous, 1 cm. long; the lobes linear, acuminate, slightly surpassing the corolla; pod thin, villous, oblong, with a lanceolate beak.

San Bernardino Mountains in the chaparral belt.

10. AMORPHA L.

Glandular-punctate and heavy-scented shrubs with unequally pinnate leaves, caducous stipules, and small purple flowers in terminal spikes. Calyx obconic-campanulate, 5-toothed, persistent. Standard erect, concave, unguiculate; wings and keel wanting. Stamens monadelphous at the base. Pod short, exceeding the calyx, sessile, indehiscent, 1-2-seeded.

1. *A. californica* Nutt. 1-3 m. high, puberulent, the nascent parts villous-pubescent; leaflets 11-15, elliptic-oblong, obtuse, 2 cm. long; spikes slender, 5-15 cm. long; calyx-teeth acute, broadly triangular.

Occasional in the upper chaparral belt in all the mountains.

11. ASTRAGALUS L. RATTLE-WEED or LOCO-WEED.

Annual or perennial herbs or sometimes woody at base, with unequally pinnate leaves, persistent stipules, and rather small flowers arranged in axillary spikes or racemes. Calyx 5-toothed. Petals with narrow blade and slender claw; keel obtuse. Stamens diadelphous. Stigma terminal, minute. Pod various, coriaceous and turgid, or thin and bladdery-inflated, 1-celled or becoming 2-celled by intrusion of one or both sutures. Seeds few to many, small, on slender funiculi.

Annuals.

Pods 4-5 mm. long, wrinkled, 2-seeded.

Pods not deflexed.

Pods strongly deflexed.

Pods 15 mm. long, 5-10-seeded.

1. *A. didymocarpus*.

2. *A. nigrescens*.

3. *A. strigosus*.

Perennials.

Pods bladdery inflated.

Pods stipitate.

Pods sessile.

4. *A. leucopsis*.

5. *A. parishii*.

Pods not bladdery inflated.

Pods on stipes half their length, in loose racemes.

Pods sessile, in dense spikes.

6. *A. antiselli*.

Pods 1-celled; flowers greenish yellow.

7. *A. pycnostachys*.

Pods 2-celled; flowers light purple.

8. *A. brauntoni*.

1. *A. didymocarpus* H. & A. Slender, 3 dm. high, pubescent with fine, somewhat scattered hairs; leaflets 9-15, cuneate-oblong to linear, emarginate, 6-10 mm. long; spikes long-peduncled, dense, ovate or oblong, 2-3 cm. long; flowers 3-5 mm. long, dull purplish; pods erect, 4 mm. long, and about as broad, scarcely exserted from the calyx, strongly wrinkled, 2-celled, 2-seeded.

Frequent on the plains and on grassy slopes of the foothills, mostly in the interior region.

2. *A. nigrescens* Nutt. Stems very slender, 1-2 dm. high, slightly pubescent; leaflets as in the last; spikes less dense, cylindric, 2 cm. long; pods deflexed, well exserted from the calyx, slightly wrinkled, strongly obcompressed; closely related to the last, but easily distinguished by fruit.

Not known within our limits, but it has been reported from Newhall and Catalina Island. March-May.

3. *A. strigosus* (Kell.) Sheldon. Slender, sparsely and minutely pubescent, 15–20 cm. high; leaflets 9–15, linear or cuneate, acute or retuse; flowers many, capitate, on a slender peduncle, purple and white; pod 15 mm. long, slender, incurved, 2-celled, 5–10-seeded.

In low ground near the coast. March–May.

4. *A. leucopsis* Torr. (RATTLE-WEED.) Stems erect, 3–5 dm. high, tomentulose-canescens; leaflets 10–15 pairs, oval or oblong, obtuse, 1 cm. long or more; spike-like racemes, 3–6 cm. long or sometimes more; flowers 12 mm. long; calyx-tube campanulate, the teeth subulate, more than half as long as the tube; pod thin, bladdery, oval, unequally sided, 2–3 cm. long, tapering to a stipe 12 mm. long or less.

Frequent on the plains. March–May.

5. *A. parishii* Gray. Nascent parts sparsely pubescent, becoming glabrous or nearly so; stems somewhat fistulose, much branched from the base and decumbent; leaves about 1 dm. long, bearing about 32 leaflets; leaflets 10–25 mm. long; racemes 2–4 cm. long; flowers greenish-white, 1 cm. long; pods sessile, 2–3 cm. long and nearly as thick.

Chatsworth Park.

6. *A. antiselli* Gray. Stems slender, erect, 3–5 dm. high, cinereous-pubescent, leaflets 21–29, linear-oblong, crowded, 4–8 mm. long, glabrous above, pubescent beneath; raceme loosely few-flowered; flowers small, greenish-white; calyx-teeth half the length of the campanulate tube; pod thin, linear-oblong, compressed, glabrous, 1-celled, 15 mm. long, 4 mm. wide, tapering to a stipe of about half its length.

On grassy hillsides in interior valleys. April.

7. *A. pycnostachys* Gray. Stout, erect, 6 dm. high, more or less villous-hoary; leaflets about 21, oblong, 12 mm. long; flowers yellowish, in dense cylindric short-peduncled spikes; pods crowded, retrorsely imbricated, ovate, acute, laterally flattened, thin-coriaceous, glabrous, coarsely reticulate, 1-celled.

In moist subsaline soil near the sea. July–September.

8. *A. brauntonii* Parish. Stems lignescent at base, 1–1.5 m. long, erect or reclining; herbage canescent throughout with a short soft pubescence; leaflets 15–20 pairs, oblong, 2–5 cm. long; flowers and fruit reflexed in compact many-flowered spikes; calyx-teeth slender, equaling the tube; corolla light purple; pod sessile, coriaceous, oblong, 1 cm. long, 2-celled by the nearly complete infolding of the dorsal suture to near the apex; seeds 2–3.

Occasional in dry places in the Santa Monica Mountains, *Hasse, Braunton*.

12. GLYCYRRHIZA L. LICORICE.

Glandular-viscid erect perennial herbs with unequally pinnate leaves more or less persistent, and flowers in dense axillary peduncled spikes. Calyx 5-cleft. Petals narrow. Stamens monadelphous or diadelphous; the

alternate anthers smaller; anther-cells confluent at the apex. Pod short, compressed, often curved, prickly, indehiscent, few-seeded.

1. *G. glutinosa* Nutt. Erect or decumbent, 6-9 dm. high, nearly glabrous and viscid with minute sessile resinous dots, or glutinous by a villous or hirsute glandular pubescence; leaflets 13-19, oblong-lanceolate, 2.5-5 cm. long; stipules ovate-acuminate to lanceolate, persistent; spikes oblong, 2.5-4 cm. long, on peduncles a little shorter; pod bur-like.

Occasional in canyons below 4000 feet, in the interior region.

13. VICIA L. VETCH.

Herbs with angular stems, more or less climbing by the tendrils at the ends of the pinnate leaves. Calyx 5-cleft or 5-toothed, the upper teeth often shorter. Wings of the corolla adhering to the middle of the keel. Stamens diadelphous or nearly so; anthers uniform. Style filiform, inflexed, the apex surrounded by hairs.

Pod flat, 2-valved. Seeds globular, usually many.

Perennials.

Herbage glabrous or nearly so.

1. *V. americana*.

Herbage villous-pubescent.

2. *V. californica*.

Annuals.

Flowers nearly sessile, 15 mm. long.

3. *V. sativa*.

Flowers 6 mm. long, on filiform peduncles.

Leaflets obtuse.

4. *V. exigua*.

Leaflets notched.

5. *V. hassei*.

1. *V. americana* Muhl. Glabrous or nearly so, weak, 6-15 dm. high, climbing by branched tendrils; leaflets 8-12, thin-membranous, vivid green above, pale beneath, mostly broadly oblong and obtuse, mucronulate, 1-2 cm. long; peduncles shorter than the leaves, 4-8-flowered; flowers purplish or bluish, about 18 mm. long; calyx-tube 4 mm. long; the lower teeth about 2 mm. long, the upper shorter, approximate, incurved.

Our forms all seem to belong to the two varieties.

1a. *V. americana truncata* (Nutt.) Brew. Leaflets oblong-elliptic or the lower broadly linear, 15-30 cm. long, truncate or broadly retuse at summit, otherwise like the type.

Occasional on shaded slopes in the chaparral belt.

1b. *V. americana linearis* (Nutt.) Wats. Leaflets narrowly linear, acute, strongly veined beneath, 12-25 cm. long.

Frequent in the chaparral belt, usually in more open places than the last.

2. *V. californica* Greene. Erect or decumbent, rather strict and seldom climbing, 1.5-4 dm. high, villous-pubescent; tendrils short, stiffish, seldom branched; leaflets 8-12, subcoriaceous, deli-

cately feather-veined, cuneate-obovate, truncate or retuse, 10–15 mm. long, more or less dentate toward the mucronulate apex; racemes exceeding the leaves, 3–5-flowered; calyx-teeth all broad and short; corolla 12–18 mm. long, deep purple.

Summit of Mount Santiago, Orange County, and in the pine belt of the Cuyamaca Mountains.

3. *V. sativa* L. Stoutish, erect or nearly so, 6–9 dm. high, somewhat pubescent; leaflets 8–12, obovate-oblong, truncate or retuse, mucronate; flowers 1 or 2, subsessile, 15 mm. long, red-purple.

Rarely seen as an escape. Native of Europe.

4. *V. exigua* Nutt. Slender, 3–6 dm. high, slightly pubescent; leaflets 4–6, oblong-linear, obtuse; peduncles filiform, shorter than the leaves, 1–2-flowered; calyx-teeth lanceolate from a broad base; corolla white or purplish, 4–6 mm. long; pod glabrous, 4–5-seeded.

Occasional on grassy hills, mostly in sandy soil.

5. *V. hassei* Wats. Taller and less delicate than the last; leaves longer and more numerous, deeply notched at apex; flowers 6 mm. long; pod shortly stipitate, 5–8-seeded.

Same range as the last and probably only a robust form of it.

14. LATHYRUS L. WILD PEA.

Much resembling *Vicia*, but usually larger with broader leaves and flowers. Style-branches dilated and flattish above, hairy along the inner side.

Lateral calyx-teeth much longer than the tube.

1. *L. violaceus*.

Lateral calyx-teeth about equaling the tube.

Corolla nearly white or faintly flesh-color.

2. *L. laetiflorus*.

Corolla purple.

3. *L. alfeldi*.

1. *L. violaceus* Greene. Sparsely and minutely pubescent throughout; stems slender, shrubby below, 1–2.5 m. high, acutely angled; stipules entire, narrow, less than half as long as adjacent leaflet; leaflets about 12, elliptic, obtuse, with a deflexed mucro; peduncles surpassing the leaves, many-flowered and rather dense; flowers 16 mm. long; lateral calyx-teeth much longer than the tube; the lowest equaling these and half as broad; the upper pair short, slightly connivent; petals purple; standard strongly obcordate; wings slightly shorter than keel.

Common in the foothills, especially in the chaparral belt.

2. *L. laetiflorus* Greene. Sparsely and minutely appressed pubescent; stems slender, herbaceous or somewhat shrubby below, 1–2.5 m. high; leaves of rather firm texture, elliptic-lanceolate; peduncles surpassing the leaves, loosely many-flowered; flowers about 22 mm. long; lateral pair of calyx-teeth broadly subulate, about equaling the tube, the lowest subulate, longer than the tube, the upper pair very short, connivent at tip; petals nearly white, faintly flesh color; standard obcordate, the sides abruptly reflexed, purple-veined; wings meeting and concealing the keel from above.

Less common than the last, but having about the same range.

3. *L. alfeldi* White. Glabrous or sparingly pubescent throughout; stem rather stout, flexuose, wingless; stipules semicordate, acuminate, thick, strongly reticulated, $\frac{1}{3}$ – $\frac{1}{2}$ as long as the leaflets and often nearly as broad, the lower coarsely lobed, acuminate-toothed; leaflets 6–10, oblong to obovate, thick and stiff, prominently reticulated, glabrous; peduncles 6–10-flowered, much exceeding the leaf; flowers 2–3 cm. long, purple; pedicels longer than the calyx-tube; calyx pubescent, upper teeth short, broadly triangular, acute, lateral pair oblong-lanceolate, equaling the tube, the lowest of equal length, subulate.

Frequent in the foothills of the interior region.

L. SPLENDENS Torr. Flowers very showy, deep rose-purple.

A very handsome species of Riverside and San Diego County, said to have been first collected at Cucamonga.

Family 50. GERANIACEAE. GERANIUM FAMILY.

Herbs with alternate or opposite, palmately lobed or pinnate leaves, and axillary solitary or clustered perfect regular flowers. Stipules commonly present. Sepals 5, rarely fewer, usually persistent. Petals of the same number, hypogynous. Stamens as many or 2–3 times as many; anthers 2-celled, versatile. Carpels 5, united about a central axis, each 1–2-ovuled, indehiscent, at length elastically splitting away from below, and beaked by the long style.

Anthers 10; carpel tails not hairy on the inside.

1. GERANIUM.

Anthers 5; carpel tails hairy on the inside.

2. ERODIUM.

1. GERANIUM L. GERANIUM.

Herbs with stipulate, palmately lobed, cleft or divided leaves and axillary 1–2-flowered peduncles. Flowers regular, 5-merous. Sepals imbricated. Petals hypogynous, imbricated. Stamens 10, generally 5 longer and 5 shorter. Style persistent, naked on the inner surface, becoming recurved. Carpel opening along the inner face.

1. *G. carolinianum* L. More or less spreading, 15–30 cm. high, loosely gray pubescent and glandular; leaves incisely 3–5-parted, 3–5 cm. broad; segments cuneate, more or less deeply toothed or dissected; peduncles 2-flowered, about 2 cm. long; petals rose color, 4–5 mm. broad; beak of fruit villous or glandular; carpels villous-hispid, usually black; seed reticulate.

Frequent on grassy hillsides of the valleys and foothills. March–April.

G. RICHARDSONI F. & M. Stems 3–6 dm. high; leaves thin, 5–12 cm. broad, incisely 3–5-parted; flower 18–20 mm. broad, white or lavender with rose-colored veins.

Frequent in open pine woods and meadows in the San Bernardino and San Jacinto Mountains. June–August.

2. ERODIUM L'Her. ALFILERILLA.

Herbs with mostly jointed nodes, opposite or alternate stipulate leaves, and axillary umbellate nearly regular flowers. Sepals 5, imbricated. Petals 5, hypogynous, imbricated, the 2 upper slightly smaller. Glands 5. Anther-bearing stamens 5, with slightly dilated filaments alternating with as many sterile filaments. Styles becoming spirally coiled after splitting away, pubescent on the inner face. Carpels closed.

Leaves rounded, crenately toothed or lobed. 1. *E. macrophyllum*.
Leaves pinnate.

Leaflets unequally and doubly serrate;
sepals not terminated by bristles. 2. *E. moschatum*.

Leaflets laciniately pinnatifid; sepals with
1 or 2 terminal bristles. 3. *E. cicutarium*.

1. *E. macrophyllum* H. & A. Mostly nearly or quite acaulescent, tomentose with copious interspersed long glandular hairs at least on the pedicels; leaves triangular-ovate or reniform, crenate-serrate, sometimes crenately-lobed; peduncles exceeding the leaves, accrescent, at length 1 cm. long; petals equaling the sepals, dull white; carpel clavate, densely velvety-pubescent; seeds smooth.

Occasional in dry grassy places in the valleys or low foothills.

2. *E. moschatum* Willd. Acaulescent and prostrate or with ascending branches, mostly rather stout and glandular; leaves rather ample; stipules large, obtuse; leaflets unequally and doubly serrate; peduncle several-flowered; flowers rose color or purple, on rather short stout pedicels; sepals not terminated by long bristles; antheriferous filaments 2-toothed.

The more prevailing species in the coast valleys. Native of southern Europe.

3. *E. cicutarium* (L.) L'Her. Much resembling the last, but more slender and less glandular, often coarsely canescent; leaflets laciniately pinnatifid with narrow, acute lobes; pedicels slender; petals rose color or purple; sepals with 1–2 terminal bristle-like hairs; filaments not toothed.

The prevailing species of the interior valleys and foothills.

Family 51. OXALIDACEAE. WOOD-SORREL FAMILY.

Annual or perennial, leafy stemmed or acaulescent herbs, often with rootstocks or scaly bulbs, with sour

sap (oxalic-acid), and mostly palmately 3-foliate leaves. Stipules commonly present as scarious margins to the bases of the petioles; leaflets mostly obcordate. Flowers perfect, in umbel-like or forking cymes or rarely solitary, on mostly rather long peduncles. Sepals 5, often unequal. Petals 5, white, purple or yellow. Stamens 10–15. Ovary 5-lobed, 5-celled; styles united or distinct; ovules 2–many in each cell. Fruit a loculicidal, globose or columnar capsule. Embryo straight; endosperm fleshy.

1. *XANTHOXALIS* Small.

Sepals imbricated, regular. Petals hypogynous. Stamens 10, monadelphous at base, 5 longer and 5 shorter, all anther-bearing. Ovules several in each cell; styles 5, distinct, persistent; stigmas terminal. Seeds with a loose aril-like dehiscent outer coat.

1. *X. californica* Abrams. Cæspitose perennial, the prostrate and rooting or ascending stems suffrutescent and more or less branched below, 15–20 cm. long or more, from a short, erect, woody caudex; leaves 3-foliate; leaflets 4–10 mm. long, often broader; petiole somewhat stipular-dilated at base; flowers 6–10 mm. broad, yellow, 1–3 on elongated, axillary peduncles which are short-bracteate at summit; petals obovate, twice as long as the calyx, usually emarginate; capsules oblong, 1–1.5 cm. long.

Common in the chaparral belt of southern California. This has been erroneously referred to the New Mexican *X. wrightii* (Gray) Small.

2. *X. corniculata* (L.) Small. Annual, cæspitose, prostrate and rooting at the nodes, somewhat rough-villous; leaflets 6–10 mm. long, mostly broader; stipules evident, rounded or truncate at summit, adnate; flowers 6 mm. long, solitary or umbelled, otherwise as in the last. (*Oxalis corniculata* L.)

Occasional about lawns and greenhouses.

Family 52. LINACEAE. FLAX FAMILY.

Herbs or shrubs with alternate or opposite leaves and perfect regular flowers. Stipules mostly small or none. Sepals 5, rarely 4, imbricated, persistent. Petals of the same number and alternate with them; filaments monadelphous at the base; anthers versatile, 2-celled. Ovary

1, 2-5-celled or falsely 4-10-celled. Styles 2-5. Fruit capsular. Seeds 1-2 in each cell, oily; endosperm little or none; embryo straight.

1. **LINUM** L. FLAX or LINSEED.

Annual or perennial herbs, sometimes woody at the base, with alternate or opposite, rarely whorled, sessile leaves, and perfect flowers. Inflorescence axillary or paniculate. Stipules a pair of glands or wanting. Sepals 5. Petals 5, fugacious. Stamens 5, sometimes with interspersed staminodia. Ovary 4-5-celled or falsely 8-10-celled; ovules 2 to each cell. Capsule 5-10-valved.

1. **L. usitatissimum** L. Annual; often tufted, erect, branching above, 3-5 dm. high, glabrous and somewhat glaucous; leaves alternate, 3-nerved, lanceolate, 1-4 cm. long, 2-6 mm. wide; stipules none; inflorescence a terminal cymose leafy panicle; flowers blue, 12-16 mm. broad, on slender pedicels; sepals ovate, acuminate, the inner ones ciliate and 3-ribbed; petals obcuneate, crenulate, twice the length of the sepals; capsule ovoid-conic, 6-8 mm. long, indehiscent; seeds compressed.

Occasional along streets about Los Angeles.

Family 53. POLYGALACEAE. MILKWORT FAMILY.

Herbs or shrubs with alternate, opposite or whorled, exstipulate leaves and racemose, spicate or solitary and axillary flowers. Pedicels generally 2-bracted at base. Flowers perfect, irregular. Sepals 5. Petals 3 or 5, hypogynous, more or less united into a tube, the lower ones often crested. Stamens generally 8, united in 1 or 2 sets. Ovary 2-celled; styles simple; stigma curved, dilated or lobed; ovules 1 in each cell, anatropous. Fruit mainly capsular. Seeds generally caruncled, often hairy; embryo straight.

1. **POLYGALA** L.

Herbs or shrubs with alternate, opposite or whorled leaves and racemose, spicate or rarely solitary flowers. Petals 3, united into a tube, which is split on the back and more or less adnate to the stamens. Stamens 8 or 6,

monadelphous below or diadelphous. Capsule membranous, compressed, dehiscent along the margin; seeds usually hairy.

1. *P. fishiae* Parry. Very slender with few erect branches, 1–2 m. high, the stems green and glabrous or minutely and sparsely strigose; leaves narrowly oblong, rounded or retuse, glabrous, 2–5 cm. long, on short petiole 2 mm. long; racemes terminating the branches, 6–35-flowered; flowers whitish and yellowish with a tinge of purple, 8–9 mm. long; wings purplish, finely ciliolate; keel yellow.

Near Sulphur Springs, Ventura County, and on the Sierra Madre-Mt. Wilson trail at about 3000 feet, a rare species, with these as the only known localities in southern California. It was originally collected in Lower California.

Family 54. EUPHORBIACEAE. SPURGE FAMILY.

Monoecious or dioecious herbs, shrubs or trees with acrid, often milky juice. Leaves opposite, alternate or whorled, entire or toothed, sessile or petioled, sometimes with glands at the base; stipules present or wanting. Inflorescence various. Flowers sometimes apetalous, often reduced and subtended by an involucre, which resembles a calyx. Stamens few or numerous, in 1 or many series; filaments distinct or united. Ovary usually 3-celled; ovules 1–2 in each cell, pendulous; styles equaling the cells in number, simple, divided or many-cleft. Fruit mostly a 3-lobed capsule separating often elastically into 3 2-valved carpels from a persistent axis. Seeds anatropous; embryo straight or slightly curved; endosperm fleshy or oily; cotyledons broad.

Flowers with true calyx, not involucrate.

Stellate-pubescent.

Perennial; capsule 3-celled; dioecious.

1. CROTON.

Annual; capsule 1-celled; monoecious.

2. PISCARIA.

Glabrous or nearly so.

Leaves small, entire.

3. STILLINGIA.

Leaves large, palmately lobed.

4. RICINUS.

Flowers subtended by an involucre; calyx represented by a minute scale at the base of the filament-like pedicel.

Glands of the involucre with petal-like appendages.

5. CHAMAESYCE.

Glands of the involucre without petal-like appendages.

6. TITHYMALUS.

1. CROTON L. CROTON.

Stellate-pubescent, more or less glandular and strong-scented herbs or shrubs, with mostly alternate, entire, toothed or lobed leaves, and monoecious or dioecious flowers in terminal or axillary clusters. Staminate flowers uppermost; calyx usually 5-parted; petals usually present, small or rudimentary, alternating with the glands; stamens 5 or more, inflexed. Pistillate flowers clustered below the staminate; calyx 5-10-parted; petals usually wanting; ovary 3-celled; ovules 1 in each cell; styles once, twice or many times 2-cleft. Capsule splitting into usually 2-valved carpels; seeds smooth or minutely pitted.

1. *C. californicus* Muell. Arg. Suffrutescent, procumbent or ascending, 4-12 dm. high, dichotomously branched; the branches slender, cinereous throughout with a dense appressed scurf; petioles slender, 2-3.5 cm. long; stipules obsolete; leaves generally oblong, 2.5-5 cm. long, 8-18 mm. wide, entire, 3-5-nerved; dioecious; staminate plants more slender and short-branched; racemes simple; flowers about 3 mm. broad, on pedicels 4-6 mm. long; sepals 5, ovate; stamens 12-15; filaments ciliate; pistillate raceme mostly 2-3-flowered; styles 3, palmately 3-5-cleft or twice 2-cleft. Capsule usually 5-6 mm. high; seeds oval or globose, 4.5-5 mm. long, black.

Common in dry ground throughout our range.

2. *C. californicus tenuis* (Wats.) Ferguson. Stems erect, 3-7 dm. high, with very slender branches, densely scaly-stellate; leaves narrowly oblong to lanceolate, 2-4.5 cm. long, 0.5-1 cm. wide, entire; petioles 5-10 mm. long, less than half the length of the leaves; staminate flowers about 2 mm. broad; stamens 10-12; seeds 3-4 mm. long.

Same range as the type, and perhaps best considered only a form of it.

2. PISCARIA Piper.

Stellate-pubescent glandular and heavy-scented annual herbs, with alternate entire 3-nerved petiolate exstipulate leaves, and monoecious apetalous flowers in axillary cymes. Calyx 5-6-parted, slightly imbricate in the staminate flowers, wanting in the pistillate. Stamens 6-7, central on the hairy receptacle; filaments exerted. Ovary with 4-5 small glands at the base, 1-celled, 1-ovuled; style simple, filiform, stigmatic at the apex. Capsule obovate-oblong, 2-valved. Seed smooth and shining; endosperm fleshy.

1. *P. setigera* (Hook.) Piper. (TURKEY MULLEIN.) Low spreading heavy-scented annual, hoary pubescent with a dense stellate and spreading hispid pubescence; leaves ovoid or rhomboid, 2-5 cm. long, on slender petioles, the upper crowded and appearing opposite or verticillate; staminate flowers few, long-pedicelled; calyx with oblong, obtuse segments, 2 mm. long; pistillate 1-3 in the axils; ovary and style densely pubescent; capsule and seed 4 mm. long. (*Eremocarpus setigerus* Benth.)

A common autumnal weed in all our valleys. Known as turkey weed.

3. RICINUS L. CASTOR-BEAN.

A tall monoecious herb, often persisting for several years and becoming a small tree. Leaves alternate, large, peltate, palmately lobed and toothed. Flowers numerous, small, apetalous, greenish, in terminal racemes, the pistillate above the staminate. Staminate flowers with a 3-5-parted calyx and numerous crowded stamens; filaments branched. Pistillate flowers with a caducous calyx. Ovary 3-celled, 3-ovuled; styles 3, united at the base, 2-cleft. Capsule subglobose or oval, smooth or spiny, separating into 3 2-valved carpels. Seeds ovoid or oblong, mottled.

1. *R. communis* L. An introduced plant which is becoming well established. In protected places it often becomes woody and tree-like.

4. STILLINGIA L.

Glabrous herbs or shrubs with alternate or rarely opposite, entire or toothed leaves, often with 2 glands at the base, and monoecious bracteolate apetalous flowers in terminal spikes; bractlets 2-glandular. Staminate flowers several together in the axils of the bractlets; calyx slightly 2-3-lobed; stamens 2-3, exserted. Pistillate flowers solitary in the axils of the lower bractlets; calyx 3-lobed; ovary 2-3-celled; ovules 1 in each cell; styles short, somewhat united at the base. Capsule 2-3-lobed, separating into 2-3 2-valved carpels. Seeds ovoid or subglobose.

1. *S. linearifolia* Wats. Herbaceous, branching from the somewhat woody base; the stems and branches slender, terete, ascending, 3 dm. high or more; leaves linear, entire or rarely obscurely glandular-toothed, acute, 1.5-2.5 cm. long; spikes slender, open, 2.5-4 mm. long, with 2-7 scattered pistillate flowers below; bracts very small, ovate, acute, minutely glandular on both sides, 1-flowered; staminate flowers minute; calyx turbinate; stamens 2; pistillate calyx none;

capsule 3 mm. broad; seed round-ovate, acute, 2 mm. long, smooth somewhat viscid.

Occasional about San Bernardino and eastward in dry barren places, and in similar places about San Diego.

5. CHAMAESYCE S. F. Gray.

Annual or perennial herbs, with opposite entire or toothed leaves, and delicate entire or fringed stipules. Involucres solitary in the axils or in axillary cymes; glands 4, sessile or stalked, naked or usually with an appendage, one sinus of each involucre glandless. Capsule smooth, sometimes pubescent, the angles sharp or rounded; seeds angled, with minute caruncles. (*Euphorbia* in part.)

Leaves entire.

Margins of the glands conspicuous, white.

Herbage green and glabrous, or somewhat finely pubescent.

Stipules united into a conspicuous membranous scale, entire or lacerate.

Stipules distinct, minute, ciliate.

Herbage cinereous with a dense soft pubescence.

Margins of glands without white appendages.

Leaves serrulate.

Stems prostrate.

Stems erect or ascending.

1. *C. albomarginata*.

2. *C. polycarpa*.

3. *C. melanadenia*.

4. *C. ocellata*.

5. *C. serpyllifolia*.

6. *C. nutans*.

1. *C. albomarginata* (T. & G.) Small. Glabrous; stems numerous from a woody perennial base, prostrate or decumbent, 5–30 cm. long; leaves nearly orbicular, 4–8 mm. broad, often retuse above and somewhat cordate at base, with a thin whitish edge; stipules united into a conspicuous membranous white triangular scale, entire or somewhat lacerate; involucres mostly solitary, campanulate or turbinate, about 1.5 mm. long; glands maroon color with a conspicuous entire white or rose-colored dilated appendage; capsule about 2 mm. long, the lobes angled on the back; seeds oblong, 4-angled.

Common and general. Flowering all summer.

2. *C. polycarpa* (Benth.) Millsp. Glabrous or somewhat finely pubescent; stems numerous from a perennial woody base, prostrate or decumbent, 5–30 cm. long; leaves round-ovate, obtuse, usually slightly cordate, 2–6 mm. long; stipules minute, short-triangular to lanceolate, ciliate, distinct; involucres mostly solitary, about 1 mm. long; glands mostly dark purple, the white or rose-colored somewhat crenate margins often very narrow; capsule small with angled lobes; seeds oblong, 4-angled, about 1 mm. long.

Occasional in the foothills, especially in the Santa Ana Mountains, more common southward.

3. **C. melanadenia** (Torr.) Millsp. Cinereous with a dense soft pubescence, much branched from the base, the branches ascending, forming tufts; root simple, somewhat lignescent, but apparently annual; leaves mostly ovate, short-petioled, usually oblique at base, one side being somewhat cordate; stipules minute, ciliate, distinct; involucre solitary; gland purple, its appendages with a white or rose-colored margin; capsule densely hirsute. (*Euphorbia polycarpa vestitus* Wats.)

Common in the chaparral belt of the San Gabriel and Santa Ana Mountains.

4. **C. ocellata** (Dur. & Hilg.) Millsp. Annual, prostrate, the branches 10–25 cm. long, glabrous; leaves 2–4 mm. long, deltoid to ovate-oblong, often cordate, thickish, entire, and revolute; involucre 2 mm. long, its lobes fringed; glands usually 4, yellowish or purplish, short-stipitate, rounded and discoid, usually without a margin; capsule 2 mm. long; seeds smooth or obscurely rugose.

Interior valleys of central California southward to southern California; Colton, *Parish*.

5. **C. serpyllifolia** (Pers.) Small. Glabrous, annual; stems prostrate or ascending, 1–3 dm. long; leaves mostly oblong, often narrowed toward the oblique base, serrulate at the rounded or retuse summit, 4–12 mm. long; stipules distinct, setaceous or lacerate; involucre solitary or in loose leafy clusters, campanulate, about 1 mm. long; glands small, greenish, the margin narrow, crenate; capsule angled, 2 mm. long; seeds sharply 4-angled, the sides somewhat rugose.

Rather frequent throughout our range in moist places, especially on borders of ponds.

6. **C. nutans** (Lag.) Small. Annual, glabrous or sparingly pubescent; stems branched, ascending or erect, 2–6 dm. long, branches often recurved at the ends; leaves opposite, oblong-ovate to linear-oblong, oblique, 3-nerved, unequally serrate, short-petioled; stipules triangular, slightly lacerate; involucre narrowly obovoid, 1 mm. long; glands subtended by small rounded reddish appendages; capsule glabrous; seeds oblong-ovoid, 1.5 mm. long, 4-angled, transversely rugose.

A local species, probably introduced from the Southern States, known only from near Santa Ana, *Helen Geis*.

6. TITHYMALUS Adans.

Annual or perennial herbs or shrubs, with simple or branched stems topped by several-rayed umbel-like cymes. Leaves below the umbel usually scattered or alternate, without stipules. Bracts of the umbel quite different from the stem leaves. Involucres with often toothed lobes. Glands 4, transversely oblong, reniform or crescent-shaped by the horn-like appendages. (*Euphorbia* in part.)

Annuals.

Glands disk-like; capsules warty.

1. *T. dictyospermus*.

Glands crescent-shaped, 2-horned; capsule smooth.

2. *T. peplus*.

Perennial.

3. *T. palmeri*.

1. *T. dictyospermus* (F. & M.) Heller. Glabrous, annual; stem simple or sometimes branching below, dichotomously branched above, 15–45 cm. high; stem leaves scattered, oblong-spatulate to obovate-spatulate, obtuse, obtusely serrate, often retuse, 1–3 cm. long; on the branches opposite, broadly ovate to oblong, the floral ones roundish-ovate, subcordate, mucronate, 4–12 mm. long; rays usually 3 times forked; involucre and glands small; styles bifid or parted; capsule with rounded and warty lobes, 2–3 mm. long; seeds subglobose, delicately netted-veined, dark colored.

Occasional in rather moist places in all our foothills and mountains, confined mostly to the chaparral belt.

2. *T. peplus* (L.) Gaertn. Annual; stems simple or branched below, erect, dichotomously branched above, 1–2 dm. high; stem leaves scattered; involucre bearing 4 crescent-shaped glands with long slender horns, and a pair of wing-like crests on each lobe.

An introduced species, growing in gardens, and greenhouses.

3. *T. palmeri* (Engelm.) Abrams, n. comb. A stout glabrous perennial, 2–4 dm. high; stems simple below, or with a few erect branches, umbelliferous above; leaves ovate, obtuse, 12–18 mm. long; the floral ones nearly reniform; involucre 2 mm. long, with rounded entire ciliate lobes; glands shortly stipitate, crenate and slightly horned; capsule ovate, 2 mm. long; seeds rugose. (*Euphorbia palmeri* Engelm.)

A common species in the coniferous forest of the San Bernardino and Cuyamaca Mountains; Swartout Canyon, San Gabriel Mountains.

Family 55. CALLITRICHACEAE.

WATER STARWORT FAMILY.

Herbaceous aquatic or rarely terrestrial plants, with slender or capillary stems, opposite exstipulate entire leaves, and minute perfect monoecious axillary flowers. Perianth none. Bracts 2, sac-like or none. Stamens 1; filaments elongated, filiform; anthers cordate, 2-celled, opening by lateral slits. Pistil 1; ovary 4-celled; ovules 1 in each cell; styles 2, filiform. Fruit compressed, lobed, the lobes more or less winged or keeled on the margins, separating at maturity into 4 flattish 1-seeded carpels. Seed anatropous, pendulous; endosperm fleshy; embryo straight or slightly curved.

1. **CALLITRICHE** L.

Characters of the family, this being the only genus.

1. **C. marginata** Torr. Usually rooting in the mud, small, with linear-oblong leaves, 4–6 mm. long or less, sometimes floating with slender stems and the upper leaves spatulate; styles elongated, reflexed, deciduous; fruit on slender spreading pedicels, 2–8 mm. long, deeply emarginate above and below, the margins of the thick carpels widely divergent, narrowly winged.

Soldiers Home, *Hasse*. Near San Diego in shallow pools on the mesa.

Family 56. LIMNANTHACEAE.

FALSE MERMAID FAMILY.

Annual herbs with alternate petioled exstipulate pinnately divided leaves and perfect regular axillary long-peduncled flowers. Sepals 2–5, valvate, persistent. Petals the same number as the sepals, alternating with as many small glands; the nearly perigynous stamens twice as many, distinct. Carpels as many as sepals and opposite them, 1-ovuled, nearly distinct; the single style slender, arising from the center as in the Geraniaceae, cleft above into as many stigmas as there are carpels. Fruit very deeply 2–5-lobed, the carpels indehiscent, rough or tubercled.

1. **LIMNANTHES** R. Br.

Low diffuse annuals, growing near water, with showy white or rose-colored flowers solitary on axillary peduncles. Carpels subglobose, at first fleshy, becoming hard and rugose.

1. **L. douglasii** R. Br. Glabrous throughout, diffusely branched from the base, the weak and succulent stems 15–45 cm. long; leaflets incisely lobed or parted with linear acute lobes; peduncles 5–10 cm. long; sepals lanceolate, 6–8 mm. long; petals oblong or obovate, emarginate or truncate, 12–16 mm. long, yellow; style very slender, 6–8 mm. long.

Growing in moist places. Reported from Los Angeles and San Bernardino.

Family 57. ZYGOPHYLLACEAE. CALTROP FAMILY.

Herbs or woody plants, with mostly opposite, stipulate, pinnate leaves with entire leaflets. Flowers perfect,

axillary, peduncled. Sepals usually none. Petals usually 5, sometimes wanting. Stamens as many as petals or 2-3 times as many; filaments usually with a thin scale at the base or near the middle. Ovary 4-12-celled; style terminal; stigma usually simple; ovules 1-numerous in each cavity. Fruit various, dry in our species.

1. TRIBULUS L.

Mostly diffuse or prostrate herbs, with evenly pinnate leaves and yellow flowers. Sepals and petals 5, deciduous. Stamens 10, hypogynous. Ovary 5-lobed, 5-celled, ovules 3-10 in each cavity. Fruit 5-angled, spiny, splitting into 3-5-seeded segments.

1. *T. terrestris* L. (GROUND BURNUT.) Pubescent much branched prostrate annual, branches 2 dm. long or more; leaflets 5-8 pairs, 6-12 mm. long; flowers solitary in the axils, 12 mm. broad; segments of the fruit usually with 2 long spines, 2 shorter and a row of very short ones forming a dorsal crest.

Railroad embankments, Los Angeles.

Family 58. ANACARDIACEAE. SUMAC FAMILY.

Shrubs or trees with a resinous and usually acrid juice, alternate simple or compound exstipulate leaves. Flowers small, regular, mostly 5-merous, often polygamous or dioecious, variously clustered. Stamens as many or twice as many as the petals. Ovary free, 1-celled and 1-ovuled; styles sometimes 3. Fruit drupaceous. The following genera were all referred to *Rhus* in the first edition.

Leaves 3-foliolate, deciduous.

Ovary and fruit glabrous; nut ribbed.

Ovary and fruit villous; nut smooth.

Leaves simple, persistent.

Ovary and fruit densely pubescent and viscid.

Ovary and fruit glabrous.

1. TOXICODENDRON.

2. SCHMALTZIA.

3. NEOSTYPHONIA.

4. MALOSMA.

1. TOXICODENDRON Mill.

Shrubs or climbing vines, with 3-foliolate or pinnate leaves, poisonous to the touch. Flowers in axillary

panicles appearing after the leaves, small, greenish or white, polygamous. Calyx 5-cleft; petals and stamens 5; ovary 1-ovuled; style terminal. Fruit a drupe with a thin outer coat soon separating from the waxy pulp which persists in strands about the ribbed stone.

1. *T. diversilobum* (T. & G.) Greene. (POISON OAK.) Erect, 1-3 m. high, or ascending trees by aerial roots to a considerable height; leaves 3-foliate, deciduous; leaflets ovate, obovate, or elliptic, very obtuse or roundish at apex, variously lobed or toothed, or rarely entire; flowers greenish, in small axillary open spreading or drooping panicles; drupes 4-6 mm. in diameter, with a thin glabrous deciduous epicarp and granular waxy persistent mesocarp; stone rugose or undulate.

Frequent in the chaparral belt throughout our range. April-May.

2. *SCHMALTZIA* Desv.

Shrubs with usually 3-foliate deciduous alternate leaves and small green polygamous spicate or capitate flowers, opening before the leaves. Calyx 5-cleft. Petals and stamens 5. Ovary 1-ovuled; styles 3, short. Fruit a small pubescent drupe with a persistent exocarp and a smooth stone.

1. *S. trilobata* (Nutt.) Small. Low branching deciduous aromatic shrub, more or less pubescent when young; leaves 3-foliate; the terminal leaflet 2.5-5 cm. long, 3-lobed and coarsely toothed above the middle; the lateral pair 1-1.5 cm. long, round-ovate, scarcely lobed, crenate; flowers yellowish, appearing before the leaves in short spike-like clusters; drupes viscid-hirsute.

Frequent in the foothills and mountains of southern California. March.

3. *NEOSTYPHONIA* Shafer.

Shrubs or small trees, with simple toothed or entire coriaceous persistent leaves. Flowers on bracted pedicels in short dense racemes closely paniculate at the ends of the branches. Calyx deeply 5-cleft, the lobes rounded, concave. Petals and stamens 5. Ovary 1-ovuled. Fruit densely pubescent and viscid, acid, the exocarp persistent; stone smooth, strongly compressed.

Leaves oval, obtuse at both ends; inflorescence cinereous.

1. *N. integrifolia*.

Leaves ovate, acute at the apex; inflorescence glabrous or glabrate.

2. *N. ovata*.

1. *N. integrifolia* (Nutt.) Shafer. Low evergreen shrub, 1-2 m. high, often more or less depressed, with short stiff branches; leaves

oval, rigid-coriaceous, very obtuse at both ends, or acutish at base, entire or sometimes serrate, 2.5–4 cm. long, dark green and shining above, veiny and paler beneath; petioles 5–8 mm. long; inflorescence and young parts cinereous or canescently puberulent; flowers white or rose-colored, glomerate, sessile, subtended by rather thick orbicular bracts within which are 2 similar but thinner bractlets; sepals oval-orbicular, scarious-margined, ciliate; drupes very viscid and acid, about 10 mm. in diameter.

Bluffs along the seashore, rarely extending inland in our range (Cahuenga Pass), but frequent in the foothills back of San Diego. February–March.

2. *N. ovata* (Wats.) Abrams. Erect or spreading evergreen shrub, 1.5–3 m. high; leaves rigid-coriaceous, very smooth and shining, ovate or subcordate, acute at apex, entire or sharply serrate; inflorescence glabrous or glabrate; bracts as in the last; calyx scarcely or not at all ciliate; fruit 8 mm. in diameter, otherwise as in the last.

Occasional in the chaparral belt throughout our range. March–April.

4. *MALOSMA* Nutt.

An arborescent shrub with simple coriaceous persistent leaves and small flowers in ample terminal panicles. Calyx 5-cleft. Petals and stamens 5. Ovary 1-ovuled. Fruit small, with a smooth whitish exocarp, beaked by the persistent styles; stone nearly smooth, thickened and rugose along one edge.

1. *M. laurina* Nutt. Erect evergreen shrub, 2–4 m. high, exhaling the odor of bitter almonds; leaves thin, coriaceous, oblong-lanceolate, entire, acute or obtuse, mucronate, 7–10 cm. long, rounded at base on rather long petioles; flowers polygamous, very small, white, numerous in ample terminal panicles; drupes whitish, 2–3 mm. in diameter, smooth; mesocarp waxy; stone minute, smooth. (*Rhus laurina* Nutt.)

Very common in the foothills and extending well up into the chaparral; less common in the interior. June–July. *Malosma* was a manuscript name, published as a synonym by Engler (DC. Monog. Phan. 4: 393. 1883.)

Family 59. ACERACEAE. MAPLE FAMILY.

Trees or shrubs with watery often saccharine sap, opposite simple and palmately lobed or pinnate leaves, and axillary or terminal cymose or racemose regular polygamous or dioecious flowers. Calyx generally 5-parted, the segments imbricated. Petals of the same number or none. Disk thick, annular, lobed, sometimes obsolete. Stamens 4–12, often 8; filaments filiform.

Ovary 2-lobed, 2-celled; styles 2, inserted between the lobes. Fruit of 2 long-winged samaras, joined at the base and 1-seeded or rarely 2-seeded. Seeds compressed, ascending; cotyledons thin, folded.

1. **ACER** L. MAPLE.

Characters of the family.

1. **A. macrophyllum** Pursh. Becoming a tall tree with thick rough and furrowed bark; leaves large, deeply 3-5-parted, the lobes irregular, coarsely toothed, soft pubescent when young, becoming glabrate above and minutely puberulent below; flowers polygamous, in many-flowered drooping racemes; sepals and petals rather broad, nearly equal; filaments pubescent at the base, inserted above the disk; anthers sagittate; carpels covered with stiff tawny hairs; wings 2.5-4 cm. long, diverging at an acute angle.

Mountain canyons between 3000 and 6000 feet.

Family 60. RHAMNACEAE. BUCKTHORN FAMILY.

Erect or climbing shrubs or small trees, often thorny. Leaves simple, stipulate, generally alternate. Stipules small, deciduous. Inflorescence commonly of axillary or terminal cymes or panicles. Flowers small, regular, perfect or polygamous. Calyx-tube obconic or cylindric, the limb 4-5-toothed. Petals 4-5, inserted on the calyx, sometimes wanting. Stamens 4-5, inserted with the petals and opposite them; anthers short, versatile. Disk fleshy. Ovary sessile, free from or immersed in the disk, 2-5-celled; ovules 1 in each cell, anatropous, ascending. Fruit a drupe or capsule, often 3-celled. Endosperm fleshy, rarely none; embryo large; cotyledons flat.

Petals clawless or wanting.
Petals long-clawed.

1. **RHAMNUS**.
2. **CEANOTHUS**.

1. **RHAMNUS** L. BUCKTHORN.

Shrubs or small trees with alternate pinnately veined (in ours) evergreen leaves, and small axillary cymose perfect or polygamous flowers. Calyx-tube urceolate, its limb 4-5-toothed. Petals 4-5, nearly sessile, somewhat emarginate and hooded, or none. Disk free from

the 3-4-celled ovary; style 3-4-cleft. Drupe berry-like, oblong or globose, containing 2-4 nut-like stones.

Petals none; leaves pungently toothed.

Leaves 6-12 mm. long; calyx-lobes triangular. 1. *R. crocea*.

Leaves 12-40 mm. long; calyx-lobes lanceolate. 2. *R. ilicifolia*.

Petals present, minute; leaves not pungently toothed.

Leaves green and glabrous beneath, serrulate. 3. *R. californica*.

Leaves tomentose, at least beneath, entire. 4. *R. tomentella*.

1. *R. crocea* Nutt. Low, much branched, the branches with short spine-like branchlets, 6-12 dm. high; leaves rigidly coriaceous, about 1 cm. long, bright green above, often yellowish beneath, roundish-ovate, glandular-denticulate; flowers about 3 mm. in diameter, reddish.

Occasional on the dry plains and in the chaparral belt of our interior region.

2. *R. ilicifolia* Kell. Shrub, sometimes arborescent, branches scarcely spinescent; leaves green on both sides, often 2.5 cm. long; flowers often 5-merous; calyx-fruit somewhat larger than in the type.

Common in the chaparral belt of southern California. In foliage closely resembling *Prunus ilicifolia*.

3. *R. californica* Esch. Shrub, sometimes arborescent, 1-4 m high, young parts pubescent, becoming glabrous; leaves thin-coriaceous, elliptic-oblong, acute or obtuse, entire or denticulate, 3-5 cm. long; flowers in small umbel-like clusters, 5-merous; petals small, ovate, emarginate; stamens exserted; fruit globose, 8-10 mm. in diameter.

Common in the chaparral belt of southern California toward the coast. Commonly called wild coffee.

4. *R. tomentella* Benth. Leaves tomentose beneath, the margins revolute, entire, otherwise closely resembling *californica*.

The more common species in the mountains, especially in the interior region.

2. CEANOTHUS L. CALIFORNIA LILAC.

Unarmed or spinescent, often arborescent shrubs, with alternate or opposite leaves, and small but showy white, blue or purple usually fragrant flowers, in often long-peduncled dense axillary or terminal clusters. Calyx 5-lobed. Petals 5, hooded, long-clawed. Ovary immersed in the disk and adnate to it at the base, 3-lobed. Disk adnate to the calyx. Style short, 3-cleft. Fruit somewhat 3-lobed, separating at maturity into 3 nutlets.

Stipules thin and mostly fugacious; leaves alternate; capsules without dorsal or apical horns; flowers racemose or paniculate.

Leaves deciduous, entire; flowers white.

1. *C. integerrimus*.

Leaves evergreen; flowers blue, rarely white.

Leaves pinnately veined, entire.

2. *C. spinosus*.

Leaves 3-nerved.

Twigs stiff and spinescent; leaves entire or obscurely serrulate.

Flowers white; capsules deeply lobed, slightly crested.

3. *C. cordulatus*.

Flowers blue; capsules shallowly lobed, crestless.

4. *C. divaricatus*.

Twigs not at all spinescent; leaves glandular-toothed.

Leaves glabrous above.

5. *C. sorediatus*.

Leaves not glabrous above.

Leaves velvety tomentose.

6. *C. tomentosus*.

Leaves hirsute.

7. *C. oliganthus*.

Stipule-bases persistent, thick and corky or spongy; capsule usually with dorsal or apical horns as well as crests; flowers umbellate.

Leaves alternate.

8. *C. megacarpus*.

Leaves opposite.

Leaves pungently toothed; horns stout.

Flowers blue; twigs and leaves glabrous.

9. *C. jepsoni*.

Flowers white; twigs and leaves tomentose.

10. *C. crassifolius*.

Leaves entire; horns slender.

11. *C. cuneatus*.

1. *C. integerrimus* H. & A. Tall, loosely branching and sometimes arborescent with green or at length somewhat brownish branches, slightly angled when young, not at all spinescent; leaves ovate, 2-6 cm. long, prominently or sometimes indistinctly 3-veined, entire, somewhat loosely hairy above when young, paler beneath and glabrescent or with a few soft hairs; petioles slender, somewhat villous, 6-8 mm. long; inflorescence 6-16 cm. long and 3-10 cm. broad; flowers blue, varying to white; fruit 5-6 mm. in diameter, somewhat lobed at apex, nearly smooth and with low but broad, deeply dorsal evanescent crests.

Frequent in the pine belt of all our mountains and in the uppermost portions of the chaparral belt.

2. *C. spinosus* Nutt. Tall shrub or somewhat arborescent, with at length cinnamon-brown, more or less divaricate, sparingly slender-spiny glabrous twigs; leaves elliptic, very obtuse or emarginate, rounded or acutish at base, coriaceous, glabrous, 2-3 cm. long, entire, petioles glabrous or appressed-pubescent, 4-8 mm. long; thyrsus 10-15 cm. long and half as broad; flowers pale blue;

carpels depressed, 6 mm. in diameter, scarcely lobed, smooth, crestless.

Santa Monica and Santa Ana Mountains, in canyons; extending northward to Santa Barbara, where it was first found by Nuttall.

3. *C. cordulatus* Kell. A low much branched shrub forming low flattened clumps, with whitish branchlets beset with short stiff spinose branchlets; leaves mainly ovate, 1–2 cm. long, usually denticulate, green above, and very minutely puberulent, pale beneath and more distinctly puberulent, 3-nerved; flowers white in simple often clustered racemes; capsules slightly depressed and deeply lobed, smooth, obscurely crested.

A very common species in the coniferous forests of the Sierra Nevada and southern California, mostly above 5000 feet.

4. *C. divaricatus* Nutt. An arborescent shrub with very pale spinose pubescent branches; leaves ovate, acute or obtuse at apex, rounded or subcordate at base, 1–2 cm. long, denticulate to nearly entire, light green and minutely puberulent above, more distinctly puberulent below and paler, firm in texture; racemes mostly simple, 5–8 cm. long; peduncles pubescent and viscid; flowers light blue; capsule 3 mm. high, shallowly lobed, smooth and crestless, very viscid.

Foothills of the southern Sierra Nevada, south to the San Bernardino Mountains, but not common south of Ventura County.

4a. *C. divaricatus eglandulosus* Torr. Distinguished from the typical form, by the glabrous twigs and entire leaves which are glabrous above and sparsely puberulent on the veins beneath.

This is the most common *Ceanothus* in the chaparral of southern California, ranging from the San Gabriel Mountains to northern Lower California.

5. *C. soledarius* H. & A. Shrubby or somewhat arborescent, 2–4 m. high, with olive or at length purplish twigs; leaves oblong-ovate, rounded or subcordate at base, glandular-dentate, 1–2 cm. long, glabrous and glossy or sparingly pubescent when young above, glabrous or minutely pubescent beneath, silky-pubescent on the principal veins and petioles; inflorescence at first villous, 2.5–5 cm. long; flowers deep blue; capsule globose, 4 mm. in diameter, smooth or slightly wrinkled, slightly lobed, crestless.

A species of the coast mountains of central California, said to occur in the San Gabriel Mountains, but not seen by the author.

6. *C. tomentosus* Parry. Shrub 2–4 m. high, with slender gray or reddish, at first tomentose and usually densely verrucose branches; leaves round-ovate or elliptic, conspicuously glandular-toothed, minutely velvety above, densely white or brownish tomentose beneath, 1–3 cm. long, short-petioled; inflorescence loosely tomentose, 2.5–5 cm. long; flowers deep blue or rarely white; capsule 4 mm. in diameter, somewhat depressed, smooth, slightly crested, distinctly lobed.

Occasional in the chaparral belt of the San Gabriel, San Bernardino and Cuyamaca Mountains, 3000–5000 feet altitude.

7. *C. oliganthus* Nutt. Shrubby or arborescent, 3–5 m. high, with grayish or reddish, densely villous, rather flexible twigs; leaves ovate to broadly elliptic, rounded or subcordate at base, obtuse or acute, 2–4 cm. long, hirsute with rather long appressed hairs above, loosely hirsute beneath especially along the veins; inflorescence loosely puberulent, villous, 2.5–5 cm. long; flowers deep blue to purplish; capsule depressed, smooth, slightly lobed, strongly crested. (*C. hirsutus* Nutt.)

Frequent in the chaparral belt of the San Gabriel Mountains; 2500–4500 feet.

8. *C. megacarpus* Nutt. Shrubby, 2–3 m. high, with gray or reddish, at first appressed-pubescent twigs; leaves rather thick, spatulate or obovate, cuneate, obtuse to emarginate, glabrous and dull above, minutely canescent beneath, 1–2 cm. long, margin slightly revolute, entire or rarely denticulate; capsule 8–12 mm. in diameter, laterally horned, apical crests low, scarcely lobed. (*C. macrocarpus* Nutt.)

Frequent in the Santa Monica and Santa Ana ranges, extending north to Santa Barbara.

9. *C. jepsoni* Greene. A rigid erect shrub, 1–2 m. high, with stiff divergent gray branches; leaves elliptic-oblong, spinose-toothed, usually infolded along the midrib, and undulate-margined, 10–18 mm. long, glossy green and glabrous above, whitish between the reticulations beneath; stipules small; flowers usually blue; capsule about 8–10 mm. high, more or less wrinkled and with very stout erect irregularly lobed or wrinkled horns.

Specimens, collected only in flower on the hills west of Pomona (*Baker*), seem to belong to this species, which is otherwise only known in the Coast Ranges north of San Francisco Bay.

10. *C. crassifolius* Torr. Shrub, 2–3 m. high, with grayish white or rusty tomentose twigs; leaves thick, elliptic-obovate, cuneate or rounded at base, obtuse, somewhat revolute, pungently dentate or rarely entire, 1.5–3 cm. long, minutely roughened, at length glabrous and pale green above, densely tomentose beneath; stipules very large; capsules 8 mm. in diameter, with 3 stout erect horns near the tip.

Common in the chaparral belt from Santa Barbara to Lower California.

11. *C. cuneatus* Nutt. A rigid erect shrub, 1–2.5 m. high, with stiff divergent grayish branches; leaves oblong-obovate, 8–15 mm. long, dull rather blue-green above and glabrous, whitish between the reticulations beneath, entire; flowers umbellate, white; capsules 5 mm. long, with 3 rather stout erect horns.

The most widely distributed of the western ceanothi, ranging from Oregon to Lower California. Within our range it is not common, being found principally on gravelly talus slopes or in washes; Azusa, Claremont.

Family 61. VITACEAE. GRAPE FAMILY.

Climbing or erect shrubs, with nodose joints, alternate petioled leaves, and small flowers in panicles, racemes or cymes. Calyx entire or 4-5-toothed. Petals 4-5, separate or coherent, valvate. Stamens 4-5, opposite the petals; filaments subulate, inserted at the base of the disk or between its lobes. Disk sometimes obsolete or wanting; anthers 2-celled. Ovary 1, generally immersed in the disk, 2-6-celled; ovules 1-2 in each cell, ascending, anatropous. Fruit a 1-6-celled, commonly 2-celled, berry. Testa bony; endosperm cartilaginous; embryo short.

1. VITIS L. WILD GRAPE.

Climbing or trailing woody vines, mostly with tendrils. Leaves simple, usually palmately lobed or dentate. Stipules generally small, caducous. Flowers mostly diœcious, or polygamo-diœcious, rarely perfect. Petals hypogynous or perigynous, coherent in a cap and deciduous without expanding. Ovary 2-celled, rarely 3-4-celled; style very short, conic; ovules 2 in each cell. Berry globose or ovoid, pulpy.

1. *V. girdiana* Munson. Strong climbing vine with thick diaphragms; leaves 15 cm. broad or less, broadly cordate-ovate, with a rather deep and narrow sinus, obscurely 3-lobed, and with many small and acute teeth, closely ashy tomentose beneath; flower clusters large, very compound; berries small, black, slightly glaucous; seeds pyriform.

Occasional along streams in the foothills. June.

Family 62. MALVACEAE. MALLOW FAMILY.

Herbs or shrubs with alternate mostly palmately veined leaves. Stipules small, deciduous. Flowers regular, perfect, or rarely diœcious or polygamous. Calyx often bracted at the base. Sepals 5, rarely 3 or 4, more or less united, usually valvate. Petals 5, hypogynous, convolute. Stamens many, hypogynous, monadelphous, forming a central column around the pistil, united with the bases of the petals; anthers 1-celled. Ovary several-

celled, entire or lobed; styles united below, distinct above, mostly as many as the cells of the ovary; ovules 1 or several in each cell. Fruit capsular, rarely a berry, several-celled; the carpels falling away entire or else loculicidally dehiscent. Embryo curved; cotyledons large, plicate or conduplicate; endosperm scanty or copious.

Carpels 2—several-seeded.

1. MODIOLA.

Carpels 1-seeded.

Stigmas linear, on the inner side of the style branches.

Stamens monadelphous.

2. MALVA.

Stamens united in phalanges in 2 series.

3. SIDALCEA.

Stigmas capitate or truncate.

Flowers rose-purple or rarely white.

4. MALVASTRUM.

Flowers cream-colored.

6. SIDA.

1. MODIOLA Moench.

Prostrate or ascending herbs often rooting from the nodes, with palmately cleft or divided leaves, and small axillary peduncled flowers. Bracts of the involucre 3, distinct. Calyx 5-cleft. Cells of the ovary many, with 2–3 ovules in each. Style branches stigmatic at the summit. Carpels 15–20, septate between the seeds, dehiscent into 2 valves, with awn-pointed tips, and aristate on the back.

1. *M. caroliniana* (L.) Don. Decumbent, annual or biennial, more or less pubescent, freely branching; stems 15–45 cm. long; leaves nearly orbicular in outline, 1–6 cm. wide, petioled, pedately 3–5-cleft, rarely simply dentate or incised; flowers axillary, 6–10 mm. broad, red; peduncles at length elongated, slender; fruit depressed-orbicular, the carpels hispid-aristate along the back.

In rather low moist places. El Monte; Santa Anita.

2. MALVA L. MALLOW.

Pubescent or glabrate herbs with dentate lobed or dissected leaves, and axillary or terminal solitary or clustered flowers. Calyx 5-cleft. Bractlets of the involucre 3, rarely none. Petals 5. Ovary many-celled; cells 1-ovuled; style branches of the same number, linear, stigmatic along the inner side. Carpels arranged in a circle, beakless, indehiscent, 1-seeded.

1. *M. parviflora* L. Glabrous or sparingly hairy annual, with erect or ascending stems, 2–10 dm. high; leaves rounded, slightly 5–7-lobed, crenate, 3–10 cm. broad; pedicels short; bractlets linear; calyx accrescent, the broadly lobed limb rotately spreading away from the mature fruit; petals white or pale blue, about equaling the calyx-lobes; achenes glabrous or pubescent, transversely and sharply rugose on the back, the acute winged margins distinctly toothed.

A common vernal weed.

2. *M. pusilla* Smith. Much resembling the last in foliage and habit; pedicels somewhat longer; calyx-lobes mostly closed over the fruit; petals bluish, 10–15 mm. long, surpassing the calyx-lobes; achenes reticulate-rugose, the margins acute, entire.

Known within our region only from low ground along Ballona Creek, near Mesmer.

3. *SIDALCEA* Gray.

Erect annual or (ours) perennial herbs with mostly palmately or pedately parted or deeply cleft leaves, small stipules, and purple or pink or sometimes white rather showy flowers, in terminal racemes or spikes, not rarely polygamous by the abortion of the anthers. Involucre rarely present. Calyx 5-cleft. Petals 5, commonly emarginate or truncate. Staminal column usually distinctly double, the exterior series of 5 distinct 4–10-antheriferous phalanges, the inner or terminal one of about 10 mostly 2-antheriferous phalanges. Carpels 5–9, reniform, indehiscent, 1-seeded.

1. *S. malvaeflora* (Moc. & Sesse) Gray. Hirsute or stems and petioles hispid with few-forked and some simple hairs; stems ascending or erect from decumbent base, 2–6 dm. high, from a thick stock or root, simple; basal leaves rounded, crenate-incised, the upper more dissected; flowers in simple few-many-flowered spiciform racemes; petals rose-purple, 2–2.5 cm. long; mature carpels rugose-reticulate. (*S. humilis* Gray; *S. delphinifolia* Nutt.)

Frequent on the grassy hills and mesas. March–May.

2. *S. parviflora* Greene. Stems glabrous at least below, subsimple, terminating in long slender loose racemes; lowest leaves orbicular, crenate-toothed, the others deeply divided, the divisions lobed; pedicels 4–6 mm. long, subtended by simple linear bracts of scarcely the same length; petals 8–12 mm. long, rounded at apex; carpels reticulated.

In low subsaline places throughout our range. Much resembling the last, but easily recognized by the glabrous stems and leaves, and by the usually smaller flowers.

4. *MALVASTRUM* Gray.

Low annual herbs or shrubs, often densely stellate-pubescent. Bractlets 1–3 or rarely wanting. Calyx-

lobes 5. Petals 5, often showy. Staminal tube simple, antheriferous at the summit. Styles filiform; stigmas capitate. Carpels 5 or more, 1-ovuled, rarely 2-valved. Seed ascending.

Annual.

1. *M. exile*.

Shrubby perennials.

Upper surface of leaves hoary with a dense stellate-tomentum.

Leaves 2-3 cm. broad, not rugose; calyx-lobes lanceolate-acuminate.

2. *M. orbiculatum*.

Leaves 6-8 cm. broad, rugose; calyx-lobes triangular.

3. *M. davidsonii*.

Upper surface of leaves green with a sparse short stellate-pubescence.

4. *M. fasciculatum*.

1. *M. exile* Gray. Stems decumbent, branching from the base, 2-4 dm. long, pubescent; leaves 12-18 mm. broad, broadly ovate, cordate or truncate at base, deeply 5-lobed, sparingly toothed, on slender petioles of about the same length; flowers mostly solitary and axillary on slender pedicels, 2-3 cm. long; bractlets 3, linear, persistent; calyx-lobes lanceolate, acuminate; petals obovate, purple, 4-6 mm. long; carpels 12-15, orbicular, glabrous, transversely rugose-reticulated.

Chatsworth Park.

2. *M. orbiculatum* Greene. Shrubby below, 1-2.5 m. high, densely soft-tomentose with long-rayed stellular pubescence; leaves roundish, shallowly or scarcely at all cordate, crenate-toothed, 2-3 cm. broad; flowers in axillary sessile or short pedunculate clusters, interrupted spicate; bractlets about equaling the calyx-lobes; calyx-tube completely hidden by the dense lanate tomentum, lobes lanceolate acuminate, 4-5 mm. long, mucronate with a more naked tip; petals rose color, about 1 cm. long.

In the San Gabriel and San Bernardino Mountains.

3. *M. davidsonii* Robinson. Tall shrub or arborescent, 2-4 m. high, densely stellate-tomentose throughout; bractlets stout; leaves deeply cordate, with narrow sinus, 5-angled or shallowly 5-lobed, varying to 3-lobed, irregularly crenate-dentate, 5-7.5 cm. broad; inflorescence a dense racemose panicle; bractlets much shorter than the calyx-lobes; calyx canescent-tomentose without more naked mucronate tips, faintly 1-nerved or enervose; petals rose-purple, 1.5-2 cm. long; carpels stellate-tomentose above.

San Fernando Valley and La Canada, in washes.

4. *M. fasciculatum* (Nutt.) Greene. Tall shrub or somewhat arborescent, 2-4 m. high, with wand-like branches, covered with a dense short stellate-tomentum; leaves angular, 5-lobed and rather coarsely toothed, densely stellate-pubescent beneath, sparsely so above, 3-5 cm. broad; inflorescence racemose, or amply racemose-paniculate; bractlets much shorter than the calyx-lobes, these triangular, as broad as long, acute; petals rose-purple, 2-2.5 cm. long. (*M. thurberi* Gray; *M. splendidum* Kell.)

Common in the lower altitudes of the chaparral belt.

5. *SIDA* L.

Herbs with serrate, crenate or lobed leaves and solitary or clustered axillary or terminal perfect flowers. Bractlets of the involucre none. Calyx 5-toothed or 5-cleft. Staminal tube anther-bearing at the summit. Carpels 5-many, 1-ovuled; style-branches of the same number, stigmatic at the summit only. Carpels indehiscent or at length 2-valved at the apex. Seed pendulous.

1. *S. hederacea* (Dougl.) T. & G. Perennial, stoutish, erect-spreading or prostrate, leafy, 2-4 dm. long, hoary-tomentose or yellowish-tomentose throughout; leaves short-petioled, about 2.5 cm. long, reniform, oblique at the base, serrate or crenate; flowers axillary, solitary or clustered, on slender at length reflexed pedicels; bractlets 1 or 2, linear; calyx-lobes acuminate; petals 2 cm. long, cream color; fruit short-conical, smooth; carpels 6-10.

Common in subsaline places. May-September.

Family 63. STERCULIACEAE. STERCULIA FAMILY.

Trees, shrubs or herbs (mostly tropical or subtropical) much resembling the Malvaceae. Calyx 5-parted, imbricated, in ours petal-like. Petals wanting in ours. Stamens in ours 5, monadelphous; anthers adnate, extrorse, 2-celled, longitudinally dehiscent. Ovary 5-celled or rarely 4-celled, with numerous horizontal anatropous ovules in the axils. Style simple, terminated by a minute undivided stigma. Capsule 5-valved. Seeds oval or ovoid; embryo straight.

1. **FREMONTODENDRON** Coville. CALIFORNIA SLIPPERY-ELM.

Shrub with hard wood and dark colored bark. Leaves tawny-canescens or ferruginous beneath. Bractlets 3, sometimes 5, minute, caducous. Sepals roundish, rotately spreading in anthesis, nectariferous-pitted at base. Stamens regular; filaments adnate to the calyx at the base, monadelphous to or above the middle; anthers elongated-oblong, emarginate at both ends, adnate to an inconspicuous connective. Capsule ovoid, firm-coriaceous. Seeds smooth.

1. *F. californicum* (Torr.) Coville. Branching shrub or arborescent, 2-7 m. high; leaves subcoriaceous, round-cordate to round-ovate, 3-5-lobed or 3-5-cleft, 2-5 cm. broad; flowers short-peduncled

on short lateral branches; calyx nearly glabrous, accrescent, thin, 5-7 cm. in diameter, light yellow in anthesis, becoming marcescent in age, within hairy at base and with a small nectariferous pit; capsule 2.5 cm. long, hispid with short pungent hairs, the cells villous within. (*Fremontia californica* Torr.)

Frequent in the upper altitudes of the chaparral belt of the interior region. June-July.

Family 64. ELATINACEAE. WATERWORT FAMILY.

Low herbs with opposite or verticillate stipulate entire or serrate leaves, and small axillary or fascicled regular perfect flowers. Sepals 2-5, imbricated. Petals of the same number, hypogynous. Stamens of the same number or twice as many. Ovary 2-5-celled; styles 2-5; ovules many, anatropous. Capsule with septicidal dehiscence; placentæ central. Seed-coat crustaceous, rugose or ribbed.

1. ELATINE L.

Small glabrous or glabrate aquatic or creeping herbs with opposite or verticillate leaves, and minute axillary mainly solitary flowers. Sepals 2-4, persistent, membranous. Capsule membranous, globose, 2-4-valved. Seeds straight or slightly curved, striate longitudinally and transversely.

1. *E. brachysperma* Gray. Terrestrial or sometimes aquatic, spreading, tufted, 2-5 cm. long; leaves oblong, oval or lanceolate, narrowed at the base, 4-6 mm. long, about 2 mm. wide; sepals, petals and stamens mainly 2; capsule globose, about 1 mm. in diameter; seeds short-oblong, nearly straight, about 0.5 mm. long, marked by 6-7 longitudinal striæ and 10-12 transverse ones.

Occasional along borders of ponds toward the coast.

Family 65. FRANKENIACEAE.

FRANKENIA FAMILY.

Low perennial herbs or undershrubs with opposite entire exstipulate leaves, sessile and often united at the membranous and somewhat sheathing base. Flowers small, perfect, solitary and sessile in the axils of the branches and branchlets. Calyx tubular or prismatic, furrowed, its lobes 4-5, valvate. Petals as many as

calyx-lobes, hypogynous, narrowed to a claw which bears an appendage on its inner face. Stamens 4–7 or rarely more, hypogynous; anther 2-celled, longitudinally dehiscent. Ovary 1-celled, with 2–4 parietal placentæ; styles 2–4-cleft into filiform divisions. Capsule invested by the persistent calyx. Seeds few, on slender funiculi which are attached to the margin of the valves.

1. **FRANKENIA** L.

Characters of the family.

1. **F. grandiflora** Ch. & Sch. Stem much branched from a somewhat woody base, more or less erect, slender, 1–3 dm. high, glabrous or soft-pubescent, very leafy; leaves obovate to narrowly oblanceolate, revolute, 6–12 mm. long, dull green; calyx linear, 6 mm. long, strongly furrowed, the lobes short, acute; petals small, red, the blade 2 mm. long or more, erose at the summit, the appendages of the claw bifid; stamens 4–7; style 3-cleft; capsule shorter than the calyx, linear, angular; seeds numerous.

Common in saline marshes. Flowering all summer.

Family 66. CISTACEAE. ROCK-ROSE FAMILY.

Shrubs or low woody plants with alternate or opposite simple leaves, and solitary, racemose, clustered or paniculate, regular, generally perfect flowers. Sepals 3–5, persistent, when 5 the 2 exterior smaller and bract-like, the inner 3 convolute. Petals 5 or 3 or sometimes wanting, fugacious. Stamens many, hypogynous. Ovary 1, sessile, 1–several-celled; ovules orthotropous, stalked; style simple; stigma entire or 3-lobed. Capsule dehiscent by valves. Seeds several or numerous; embryo slender; endosperm present.

1. **HELIANTHEMUM** L.

Woody herbs or low shrubs, more or less branching, mostly with showy yellow flowers. Petals 5, yellow, fugacious. Stamens numerous. Placentæ or false septa 3, ovules few–many; style short or filiform or spatulate, jointed with the ovary; stigma capitate or 3-lobed. Embryo curved.

1. *H. scoparium* Nutt. (ROCK-ROSE.) Stems tufted, slender, somewhat woody below, sparsely stellate-pubescent, 2.5–3.5 dm. high; leaves few, narrowly linear, 8–20 cm. long; flowers on slender pedicels, solitary or cymose at the ends of the branches; sepals 6 mm. long, acuminate, the 2 outer linear and much shorter; petals 6–8 mm. long; stamens about 20; capsule equaling the calyx.

Frequent on dry ridges in the chaparral belt of all the mountains and foothills.

H. ALDERSONII Greene. A larger, nearly glabrous plant, with petals 10–15 mm. long.

Common in the foothills of San Diego County.

Family 67. VIOLACEAE. VIOLET FAMILY.

Ours herbs with alternate or basal simple entire or lobed leaves, and axillary or scapose usually solitary perfect irregular flowers. Sepals 5, unequal. Petals 5, hypogynous, imbricated in the bud, the lower one spurred. Perfect stamens 5, hypogynous; anthers erect, connivent in a ring, sessile or on short filaments. Ovary 1, 1-celled, with 3 parietal placentæ; style simple. Capsule dehiscent by valves. Seeds anatropous with a crustaceous testa; embryo straight; endosperm copious.

1. VIOLA L. VIOLET.

Characters of the family. The later flowers often are produced on runners or on short peduncles, and apetalous or cleistogamous and abundantly fertile, while the early showy ones are often sterile.

Flowers white or blue.

Leaves crenate; flowers blue, rarely white. 1. *V. cucullata*.

Leaves entire; flowers white with purple veins. 2. *V. blanda*.

Flowers yellow.

Leaves crenate. 3. *V. pedunculata*.

Leaves lobed or dissected. 4. *V. lobata*.

Leaves bipinnately dissected. 5. *V. douglasii*.

1. *V. cucullata* Ait. Acaulescent, the leaves and scapes directly from rather short and thick rootstocks, glabrous or somewhat villous-pubescent; leaves rounded-cordate, reniform or hastate-reniform, the basal sides often cucullate-involute; corolla only saccate-spurred, blue or violet-purple, rarely white; lateral petals bearded toward the base; style gibbous-clavate, beardless at summit.

In swamp-lands about Los Angeles, according to *Davidson*; San Bernardino, *Parish*.

2. *V. blanda* Willd. Acaulescent, leaves and scapes from slender filiform rootstocks, glabrous or nearly so; leaves thin, ovate-cordate to round-reniform, crenulate; petals oblong to ovate-lanceolate; petals white with purple veins on the lower and sometimes the lateral ones, usually beardless; spur short and saccate.

Occasional about cold springs in the upper portions of the pine belt of the San Bernardino and San Jacinto Mountains.

3. *V. pedunculata* T. & G. Stems 5–15 cm. long, prostrate or ascending, puberulent or nearly glabrous; leaves rhombic-cordate, usually almost truncate at the broad base, obtuse, coarsely crenate; stipules foliaceous, narrowly lanceolate, entire or incised; peduncles erect, much exceeding the leaves, 10–20 cm. long; conspicuously bibracteolate; flowers 2 cm. broad or more, yellow, the upper petal dark brown without, the others purple-veined within, the lateral ones bearded.

Frequent in open grassy places in the lower foothills and on the mesas. March–April.

4. *V. lobata* Benth. Rootstocks erect; stems stoutish, erect, 15–30 cm. high, leafy to the summit, puberulent or nearly glabrous; leaves reniform or cordate in outline, 5–10 cm. broad, palmately cleft into 5–9 narrowly oblong lobes, the central largest or longest, some of the basal leaves often less lobed or merely coarsely toothed; petals 12 mm. long, yellow, the upper brownish without, the lateral slightly bearded.

Occasional on the borders of mountain meadows in the San Bernardino Mountains. Bear Valley.

5. *V. douglasii* Steud. Stems clustered from a deep fascicled root, mostly subterranean, only the leaves and flowers appearing above the ground, more or less pubescent; leaves large, bipinnately dissected into long linear or oblong segments; stipules lanceolate, entire or toothed; peduncles equaling or exceeding the leaves; petals 10–14 cm. long, yellow, the upper brownish purple without. (*V. chrysantha* Hook.)

Bear Valley, San Bernardino Mountains.

Family 68. LOASACEAE. LOASA FAMILY.

Erect or climbing branching herbs, often armed with hooked stinging or viscid hairs, with alternate or opposite exstipulate leaves, and solitary, racemose or cymose, regular and perfect flowers. Calyx-tube adnate to the ovary, its limb 4–5-lobed, persistent. Petals 4–5, inserted on the throat of the calyx. Stamens many, inserted with the petals; filaments filiform, commonly arranged in clusters, opposite the petals; anthers introrse, longitudinally dehiscent. Ovary 1-celled, rarely 2–3-celled with 2–3 parietal placentæ; styles filiform, entire or 2–3-lobed; ovules anatropous; endosperm scanty.

Seeds prismatic, not separated by lamellae; petals 5; annuals.

1. *MENTZELIA*.

Seeds flat, winged, separated by horizontal lamellae; petals (in ours) 10.

2. *NUTTALLIA*.

1. *MENTZELIA* L.

Erect herbs with alternate entire lobed or pinnatifid leaves, and terminal solitary or cymose flowers. Petals 5, spreading, convolute in the bud, usually yellow. Styles 3, more or less united. Capsule dehiscent at the tip, few-many-seeded. Seeds angled or prismatic, not separated by lamellae, roughened or striate.

Filaments all filiform.

Petals 5 mm. long or more.

Calyx-lobes lanceolate, 3 mm. long.

1. *M. davidsoniana*.

Calyx-lobes subulate, 4-6 mm. long.

2. *M. affinis*.

Petals 2 mm. long; calyx-lobes 1 mm. long.

3. *M. pinetorum*.

Filaments, at least the outer, dilated or subulate.

Calyx-lobes 2 mm. long; petals 3 mm. long.

4. *M. micrantha*.

Calyx-lobes 4-10 mm. long; petals 8-16 mm. long.

5. *M. gracilentia*.

1. *M. davidsoniana* Abrams (n. comb.). Erect, 2-3 dm. high; leaves somewhat pinnatifid or nearly entire; calyx-lobes lanceolate, 3 mm. long; petals 8 mm. long; bracts conspicuous, mostly scarious, concealing the capsules; seeds irregularly angled, only occasionally grooved. (*Acrolasia davidsoniana* Abrams.)

Open pine forests of the San Gabriel Mountains; Mt. Wilson, Mt. Gleason.

2. *M. affinis* Greene. Stems stouter, 3-6 dm. high, simple and leafy below, widely branching above; leaves lanceolate, deeply sinuate-pinnate; flowers scattered, 12 mm. broad; calyx-lobes attenuate, subulate, 4-6 mm. long; filaments all filiform; capsule 2.5 cm. long, almost linear, hispid with short stiff hairs; seeds prismatic, with grooved angles.

Frequent in the upper portions of the chaparral belt and among the pines. May-July.

3. *M. pinetorum* (Heller) Abrams (n. comb.). Distinguished from other southern California species by the very small flowers; calyx-lobes 1 mm. long; petals 2 mm. long; capsule long attenuate. (*Acrolasia pinetorum* Heller.)

Mt. Wilson, according to Davidson; Rock Creek, Abrams & McGregor.

4. *M. micrantha* T. & G. Rather slender, 3-6 dm. high, simple below, corymbosely and rather compactly dichotomous above; leaves ovate, acute or acuminate, serrate or sinuate-toothed or entire, 2.5-5 cm. long; flowers small, shorter than the floral leaves; calyx-lobes 2 mm. long; petals oval, 3 mm. long; 5 outer stamens with dilated filaments; capsule cylindric or nearly so, 6-12 mm.

long, few-seeded; seeds prismatic, with a very shallow groove, the sides faintly tuberculate.

Occasional in the chaparral belt throughout our range.

5. *M. gracilentia* T. & G. Stems rather stout, 3–4 dm. high, branching from the base; leaves narrowly lanceolate, pinnatifid, with many narrow lobes, or only sinuate-toothed; flowers usually clustered; calyx-lobes 4–10 mm. long; petals obovate to oblanceolate, 8–16 mm. long; filaments subulate-filiform; capsule slightly clavate-dilated, 12–24 mm. long; seeds in 3 rows; irregularly angular, minutely tuberculate, 1.5 mm. long.

Frequent on the plains and foothills and also on the sand-dunes along the seashore.

2. *NUTTALLIA* Raf.

Perennial herbs, with alternate or pinnatifid leaves and terminal, cymose or solitary showy flowers. Calyx-tube mostly obconic, 5-lobed. Petals 5 or in some species 10. Ovary 1-celled; styles 3. Capsule dehiscent at the summit, the placentæ with horizontal lamellæ between the seeds. Seeds in 2 rows, flat and more or less winged.

1. *N. laevicaulis* (Dougl.) Greene. (BLAZING STAR.) Biennial; stem stout, erect, branched above, 6–10 dm. high, often white; leaves lanceolate, sinuate-toothed, 5–15 cm. long; flowers sessile on short branches, 6–8 cm. broad, light yellow, diurnal; calyx-tube naked; calyx-lobes 2.5 cm. long or more; petals 10, rarely 5, oblanceolate, acute; stamens numerous, about equaling the petals in length, the outer with dilated filaments; capsule 3 cm. long; seeds many in double rows on the 3 placentæ, horizontally flattened and winged, minutely tuberculate, 3 mm. broad. (*Mentzelia laevicaulis* T. & G.)

Frequent in dry washes in our interior valleys and canyons. May–September.

Family 69. DATISCACEAE. DATISCA FAMILY.

Ours smooth stout perennial herbs with unequally lacinate pinnatifid leaves, and small dioecious or sometimes perfect flowers arranged in leafy racemes. Calyx of sterile flowers very short with 4–9 unequal lobes; stamens 10–25, with short filaments. Pistillate flowers with calyx-tube ovoid, somewhat 3-angled, 3-toothed; stamens when present 3, alternate with the teeth. Styles 3, bifid, the linear lobes stigmatic on the inner side. Capsule 1-celled, opening at the apex between the styles. Seeds many, small, in several rows on the 3 parietal placentæ; embryo cylindric; endosperm present.

1. **DATISCA** L. DURANGO ROOT.

Characters of the family.

1. **D. glomerata** (Presl) B. & W. Stems erect, 1–2 m. high, simple or sparingly branched; leaves ovate or lanceolate in outline, acuminate, about 15 cm. long, the floral shorter; flowers 4–7 in each axil of the long leafy raceme; petals minute or wanting; the fertile flowers perfect; anthers subsessile, 4 mm. long, yellow; styles exceeding the ovary; capsule oblong-ovate, 6–8 mm. long, slightly narrowed toward the truncate triangular 3-toothed summit.

Frequent along the streams in all our mountains, mostly in the upper portions of the chaparral belt.

Family 70. CACTACEAE. CACTUS FAMILY.

Fleshy plants with flattened, terete, rigid or tubercled, continuous or jointed stems, leafless or with small leaves, generally spiny, the spines developed from cushions of minute bristles (areolæ). Flowers mostly solitary, sessile, terminal or lateral, perfect, regular and showy. Calyx-tube adnate to the ovary, its limb manylobed or with distinct sepals. Petals numerous in several rows, mostly distinct. Stamens numerous, inserted on the throat of the calyx, with filiform filaments and small anthers. Ovary 1-celled, with numerous anatropous ovules borne on several parietal placentæ. Style terminal, elongated; stigmas numerous. Fruit a berry, mostly fleshy. Seeds smooth or tubercled, the testa usually crustaceous or bony; endosperm scanty or copious.

Spines never barbed; flower-bearing areolæ distinct from those bearing the spines.

1. **BERGEROCACTUS.**

Spines minutely barbed; flowers from the same areolæ as the spines.

2. **OPUNTIA.**

1. **BERGEROCACTUS** Brit. & Rose.

Stems cylindric, with the spine-bearing areolæ on vertical ribs. Flowers from the older or fully developed parts of the plant bursting through the epidermis just above the bunches of spines, usually about as long as broad, sometimes elongated. Scales of the ovary distinct, with woolly axils and acicular spines. Fruit

succulent, covered with spines. Seeds black; endosperm none; embryo straight or curved.

1. *C. emoryi* Engelm. Stems spreading, branching from the base, cylindric, with 16–20 ribs, closely set with prominent hemispheric areolæ, bearing numerous thin straight yellow interlocked spines; radials 40–50, very slender; central solitary, stouter and much longer; flowers greenish yellow, 3–6 cm. broad, crowded on one side near the end of the branches; fruit globose, very spiny, 3.5 cm. in diameter; seeds obovate, acutely keeled, shining and minutely tuberculate, 2.4–2.8 mm. long.

Said to occur from San Diego to the Salinas Valley, but we have not seen it north of San Diego. Tia Juana.

2. *OPUNTIA* Mill.

Plants with flat or cylindric more or less tuberculate joints and conspicuous but caducous leaves. These each with an axillary areole, which is usually clothed with soft wool intervened with barbed bristles at the upper edge and usually bearing spines at the lower edge. Flowers developed from the bristle-bearing part of the areole, with rotate corollas. Ovary covered with caducous leaves bearing axillary wool and often bristles and spines. Fruit dry or succulent. Seeds large, flattened and discoid, often margined, whitish; cotyledons foliaceous, curved about the endosperm.

Joints flattened. (PRICKLEY PEARS.)

Areoles 35–50 mm. apart.

Areoles 25 mm. apart.

Joints cylindrical. (CHOLLA.)

Petals greenish yellow.

Petals deep red.

1. *O. occidentalis*.

2. *O. littoralis*.

3. *O. bernardina*.

4. *O. prolifera*.

1. *O. occidentalis* Engelm. Erect and spreading, 1–3 m. high, usually forming thickets; joints often 3 dm. long and 2 dm. wide; areoles remote, about 4 cm. apart, with very fine closely set bristles, 1–3 white (dusky at base) deflexed spines; fruit sour, very juicy; seeds 5–6 mm. broad, their margins crenulate.

Frequent in our valleys and foothills from Los Angeles eastward.

2. *O. littoralis* (Engelm.) Britton & Rose. Erect or spreading, about 10 dm. high; joints often 30–45 cm. long and 20–25 cm. wide; areoles usually about 2.5 cm. apart; spines straw color (dusky at base), deflexed, slender; seeds 3–4 mm. broad, their margins undulate.

Frequent on bluffs along the seashore.

3. *O. bernardina* Engelm. Stems erect or nearly so, loosely branched, slender, 6–15 dm. high, with reticulate wood; joints

cylindric, 7.5–30 cm. long, with slender oblong tubercles, 2.5–3 cm. long; areoles with a dense row of very short, dark, more or less persistent bristles at upper edge; spines yellow, the sheathed ones 4–5, 1–3 cm. long, the lowest longest and usually reflexed; and 4 appressed short radial ones mostly on lower edge of pulvinus; flowers greenish yellow, tinged with red without, 2.5–4 cm. broad; fruit ovate, less than 2.5 cm. long, at length dry; seed flat, 6 mm. broad, with a channeled commissure and conspicuous persistent funiculus.

Frequent on the interior plains east of Monrovia; also in the Santa Clara Valley, Ventura County.

4. *O. prolifera* Engelm. Stems 1–3 m. high, much branched and often forming thickets, with reticulated wood; joints cylindric, dark green, 7.5–15 cm. long, 3.5–5 cm. thick; areoles tomentose and the older with fine straw-colored bristles; spines 8–10, variable, with large loose yellowish or rusty sheaths, 2.5–3.5 cm. long, 1 subcentral, the others stellate-spreading; flowers dark red, 3.5 cm. broad; fruit clavate to subglobose, strongly tuberculate like the joints, often proliferous; seeds large, 6 mm. broad with broad commissure.

Common about San Diego. Known in our region only at San Pedro, where it is growing on bluffs near the bay.

Family 71. LYTHRACEAE. LOOSESTRIFE FAMILY.

Herbs or shrubs, often trees in tropical regions, mostly with opposite leaves and solitary or clustered perfect flowers. Stipules usually none. Calyx persistent, free from the ovary, but generally enclosing it, the limb toothed and often with accessory teeth in the sinuses. Petals as many as primary calyx-teeth or none. Stamens various, inserted on the calyx; anthers versatile, longitudinally dehiscent. Ovary 2–6-celled, or sometimes 1-celled; style 1; stigma capitate, 2-lobed; ovules many, rarely few, anatropous. Capsule 1–several-celled, variously dehiscent or sometimes indehiscent. Endosperm none; cotyledons flat, often auricled at base.

Calyx-tube campanulate or hemispheric.

1. AMMANNIA.

Calyx-tube cylindric.

2. LYTHRUM.

1. AMMANNIA L.

Annual glabrous or glabrate herbs, mostly with 4-angled stems, opposite sessile narrow leaves, and small axillary solitary or clustered flowers. Calyx campanulate, globose or ovoid, 4-angled, 4-toothed, often with small accessory teeth in the sinuses. Petals 4, deciduous.

Stamens 4-8, inserted on the calyx-tube; filaments slender or short. Ovary enclosed in the calyx-tube, nearly globose, 2-4-celled, bursting irregularly.

1. *A. coccinea* Rottb. Erect, glabrous, branching below, 15-45 cm. high; leaves linear lanceolate, all obtusely cordate, auriculate, dilated at the somewhat clasping base, acuminate or acute at the apex, entire, 2.5-7.5 cm. long, 2-6 mm. broad; flowers 1-5 in each axil, sessile or nearly so; petals purple, fugacious; style very slender, more than half the length of the capsule.

Soldiers Home, *Hasse*.

2. *LYTHRUM* L.

Herbs or shrubs with 4-angled stems, opposite, alternate or rarely verticillate entire leaves, and solitary cymose-paniculate and terminal flowers. Calyx-tube cylindric, 8-12-ribbed, with 4-6 primary teeth and as many accessory ones in the sinuses. Petals 4-6, rarely wanting. Stamens 8-12, inserted on the calyx-tube. Capsule enclosed by the calyx, membranous, 2-celled, 2-valved or bursting irregularly. Seeds flat or angular.

1. *L. californicum* T. & G. Stems erect from a perennial stoloniferous root, simple below, paniculately branched above; lower leaves lanceolate, the upper and floral linear, acute at apex, tapering below to a sessile base; calyx with 12 striæ and very short teeth; stamens not at all exerted and the style elongated, or the stamens much exerted and exceeding the short style.

Common in damp ground along streams, both in the valleys and mountains. July-October.

Family 72. ONAGRACEAE. EVENING-

PRIMROSE FAMILY.

Annual or perennial herbs, rarely shrubs, with alternate or opposite leaves, no stipules or mere glands in their places, and axillary spicate or racemose, generally perfect regular or sometimes irregular flowers. Calyx-tube adnate to the ovary, often prolonged beyond, the limb 2-6-lobed, usually 4-lobed. Petals 2-9, mostly 4, convolute in the bud, rarely none. Stamens commonly as many or twice as many as the petals and inserted with them on the summit of the calyx-tube, or on the epigynous or perigynous disk. Ovary 1-6-celled, usually

4-celled; styles united; stigma capitate, discoid or 4-lobed; ovules many in each cell. Fruit usually a capsule. Seeds mostly small, sometimes with a coma; endosperm scanty or none; embryo straight.

Calyx-tube not produced above the ovary, its lobes persistent.

Calyx-tube usually produced above the ovary, the free portion and lobes deciduous.

Seeds comose.

Flowers showy, scarlet.

Flowers small, white or purplish.

Seeds naked.

Anthers attached at or near the base and remaining erect.

Flowers minute; calyx-lobes erect.

Flowers showy; calyx-lobes erect or united at the tip and turned to one side in anthesis.

Petals distinctly clawed.

Petals sessile.

Anthers attached in the middle and versatile.

Capsule 4-celled.

Stigma 4-lobed; calyx-tube much exceeding the capsule.

Flowers yellow; seeds angled, in 2 rows.

Flowers white or pink; seeds not angled, in 1 row.

Stigma capitate.

Calyx-tube with a lobed disk at the throat.

Calyx-tube naked at the throat.

Capsule 2-celled; flowers minute.

1. JUSSIAEA.

2. ZAUSCHNERIA.

3. EPILOBIUM.

4. BOISDUVALIA.

5. CLARKIA.

6. GODETIA.

7. OENOTHERA.

8. ANOGRA.

9. EULOBUS.

10. SPHAEROSTIGMA.

11. GAYOPHYTUM.

1. JUSSIAEA L.

Perennial herbs with alternate, usually entire leaves, and white or yellow axillary solitary flowers. Peduncles mostly 2-bracted at the summit. Calyx-tube elongated, cylindric or prismatic, adnate to the ovary but not prolonged beyond it, the limb 4-6-lobed, the lobes acute, persistent. Petals 4-6, rarely more, inserted under the margin of the disk. Stamens 8-12 in 2 rows, inserted with the petals; filaments short. Ovary 4-6-celled; stigma 4-6-lobed; ovules many. Capsule linear, oblong or club-shaped, angular or ribbed, septically dehiscent. Seeds numerous.

1. *J. californica* (Wats.) Jepson. Perennial; stems stout, 3–12 dm. long, floating or nearly prostrate on mud; leaves obovate to obovate-oblong, or on the floating stems sometimes lanceolate, obtuse or acute, 2.5–6 cm. long, on petioles 1–2.5 mm. long; stipules gland-like or somewhat scale-like; flowers 12–16 mm. broad, deep yellow; the petals obtuse; fruit 2.5 cm. long, spongy, indehiscent; pedicel 1 cm. long or more. (*J. repens californica* Wats.; *Ludwigia diffusa californica* Greene.)

In stagnant water or muddy bottoms, in marshes toward the coast. Cienega; Mesmer; Alamitos.

2. ZAUSCHNERIA Presl.

Perennial herbs or somewhat suffrutescent plants, spreading by subterranean shoots. Leaves opposite, except those of the floral branches. Flowers racemose along the leafy branches, large, scarlet. Calyx-tube globose, inflated just above the ovary, then becoming funnelform, 4-lobed, bearing 8 small scales within at the upper end of the short proper tube, 4 erect and 4 reflexed. Petals 4, little exceeding the calyx-lobes, obcordate or deeply cleft. Stamens 8, the 4 alternate with the petals inserted lower down and appearing shorter; anthers linear-oblong, attached by the middle. Style long, exserted; stigma peltate or capitate, 4-lobed. Capsule slender fusiform, obtusely 4-angled, 4-valved, many-seeded. Seeds small, comose.

1. *Z. californica microphylla* Gray. Stems tufted, 5–10 dm. high, somewhat woody at base; herbage canescent with dense firm tomentum; leaves many, fascicled, narrowly linear, somewhat mucronate; flowers usually somewhat fascicled, 1–2 terminating the branchlets; calyx narrowly funnelform, 3 cm. long, its lobes lanceolate, about 1 cm. long; petals slightly exceeding the calyx-lobes, rather deeply 2-lobed, narrowed toward the base, the lobes rounded at apex; stamens about equaling the petals.

Frequent on dry hillsides in the foothills, mostly below 3000 feet.

2. *Z. californica latifolia* Hook. Stems herbaceous, 3–6 dm. high; herbage somewhat canescent; leaves ovate-lanceolate, nearly smooth.

This subspecies is common in the coniferous belt of the San Gabriel and San Bernardino Mountains.

3. EPILOBIUM L. WILLOW-HERB.

Herbs or sometimes shrubby plants with alternate or opposite leaves, and axillary or terminal solitary or racemose flowers. Calyx-tube linear, produced beyond the ovary, the limb 4-parted, deciduous. Petals 4,

mostly obovate or obcordate. Stamens 8, anthers oblong or linear, short. Ovary 4-celled; united styles slender or filiform; stigma club-shaped or 4-lobed. Capsule elongated, 4-sided, 4-celled, loculicidally dehiscent by 4 valves. Seeds small, numerous, with a tuft of hairs (coma) at the summit.

Annual.

1. *E. paniculatum*.

Perennials.

Leaves canescent.

2. *E. holosericeum*.

Leaves not canescent.

3. *E. parishii*.

1. *E. paniculatum* Nutt. Stems erect at base, slender, terete, loosely dichotomously branched, glabrate at base, somewhat glandular-pubescent above or nearly smooth, 3-8 dm. high; leaves chiefly fascicled and alternate, lanceolate or linear-lanceolate, acute, sparingly denticulate, tapering to a slender winged petiole, 3-5 cm. long, becoming smaller and bract-like above; flowers scattered toward the ends of the branches; petals about 8 mm. long, violet; capsules fusiform, falcate, about 2 cm. long; seeds about 1 mm. broad, 2 mm. long, papillate.

Frequent in dry ground in the foothills and mountains. June-August.

2. *E. holosericeum* Trelease. Stems slightly woody, loosely branching, 5-8 dm. high, at least the upper leaves and branches canescent with subappressed hairs; leaves 5 cm. long, oblong-lanceolate, obtuse or sometimes acute, undulately low-serrulate, narrowed, or abruptly contracted and then cuneately narrowed into short petioles; flowers in long succession along the elongated branches, pale, barely 5 mm. long; fruiting pedicels about 1 cm. long; seeds short-beaked, very finely papillate, 0.4 mm. broad, 1 mm. long.

Frequent in low ground in all the valleys.

3. *E. parishii* Trelease. Rather stout and intricately branched even from the base, 5-8 dm. high, glabrous below, the inflorescence and capsules very sparingly, the young buds densely white-tomentose; leaves 25-75 mm. long, lanceolate, very obtuse or the reduced uppermost acutish, somewhat unequally or abruptly narrowed to slender more or less elongated petioles, rather thin and glabrous; flowers at length numerous, rose-colored; fruiting peduncles about 15 mm. long; seeds short-beaked, 0.4 mm. broad, 1-1.25 mm. long.

Common in damp land in the valleys and along streams below 4000 feet.

4. *BOISDUVALIA* Spach.

Annual erect or decumbent rather rigid herbs, with numerous alternate sessile leaves, and small purple flowers in leafy-bracted spikes. Calyx-tube funnelform above the ovary, deciduous; the lobes erect in flower.

Petals 4, obovate-cuneiform, sessile, 2-lobed. Stamens 8, all perfect, unequal; filaments slender, naked at base; anthers oblong, fixed near the base. Ovary 4-celled, several-ovuled; stigma-lobes short, somewhat cuneate. Capsule membranous, ovate-oblong to linear, nearly terete, acute, dehiscent at the base. Seeds in 1 row in each cell, naked and smooth.

1. *B. glabella* (Nutt.) Walp. Usually much-branched, the branches decumbent or ascending, bluish green, densely soft-villous to glabrous; leaves about 12 mm. long or more, ovate-lanceolate, acute, serrulate, the upper similar; flowers in a terminal cluster and a few shorter lateral spikes, also occasionally in the lower axils, shorter than the subtending leaves; petals about 2 mm. long, violet; capsules rather slender, nearly straight, usually acute, about 7 mm. long, subterete, with 4 broad nerves or laterally somewhat 2-keeled, loculicidal; seeds about 6 in each cell, subfusiform, about 0.35 mm. broad, 1 mm. long.

Low ground. Santa Monica; Mesmer; San Diego. July-October.

5. *CLARKIA* Pursh.

Erect sparingly branched annuals with alternate petiolate leaves, and racemose or spicate flowers nodding in the bud. Calyx-tube more or less prolonged above the ovary, deciduous. Petals 4, clawed, often lobed or cleft. Stamens normally 8, those opposite the petals often sterile, rudimentary or wanting; anthers oblong or linear, fixed by the base. Ovary 4-celled; style elongated; stigma 4-lobed, the lobes spreading. Capsule linear, alternate above, coriaceous, straight or somewhat curved, 4-angled, 4-valved to the middle. Seeds angled or margined.

1. *C. elegans* Dougl. Glabrous or somewhat puberulent, glaucous, 3-15 dm. high, simple or somewhat branched, rather stout and rigid; leaves broadly ovate to linear, repand-dentate; petals entire, the rhomboidal limb about equaling the linear claw; filaments all perfect, with a densely hairy scale on each side at base; capsule 1-2 cm. long, stout, sessile, 4-angled, somewhat curved, often hairy.

Frequent in the chaparral belt, especially toward the coast, extending south to San Luis Rey River.

2. *C. rhomboidia* Dougl. Puberulent or glabrous, 3-10 dm. high, rather slender, branching above; leaves thin, entire, oblong-lanceolate or oblong-ovate, 2.5-5 cm. long; blade of petal rhomboidal, the claw short, broad, often toothed; stamens all perfect, the filaments with hairy white scales at base; capsules pedicellate, 16-24 mm. long, 4-angled, glabrous, curved near the base.

Frequent in the pine belt of all our mountains.

6. *GODETIA* Spach.

Erect simple or branching annuals, with alternate entire or denticulate leaves, and mostly purple flowers, showy in leafy spikes or racemes. Calyx-tube obconic or short-funnelform, deciduous. Petals 4, broad, sessile, entire, emarginate or cleft. Stamens 8, unequal, the filaments opposite the petals shortest; anthers perfect, elongated, basifixed, erect or arcuate-recurved. Ovary 4-celled, many-ovuled; style short; stigma-lobes short, linear or roundish. Capsule ovate to linear, 4-sided, coriaceous, loculicidally dehiscent. Seeds in 1 or 2 rows, obliquely angled, the upper part tuberculate-margined.

Flowers erect in bud.

Stigma-lobes short-oblong; petals 6–12 mm. long.

1. *G. quadrivulnera*.

Stigma-lobes linear-oblong; petals 12–18 mm. long.

2. *G. viminea*.

Flowers nodding in bud.

Petals purple or rose-color.

Petals without claw.

3. *G. bottae*.

Petals with a short claw.

4. *G. dudleyana*.

Petals cream-color.

5. *G. epilobioides*.

1. *G. quadrivulnera* Spach. Stems slender, 3–6 dm. high, puberulent; leaves linear or linear-lanceolate, entire or sparsely denticulate; calyx-tube obconic, 4–6 mm. long; petals purplish, often with a dark spot at summit, 6–12 mm. long; stigma-lobes purple, short; capsule 12–18 mm. long, attenuate at apex, bicostate at the alternate angles, puberulent or somewhat villous.

Common on dry hillsides and open places in the chaparral belt.

2. *G. viminea* Spach. Stems erect, 3–6 dm. high, nearly or quite glabrous; leaves linear-lanceolate, entire, 2.5–5 cm. long; calyx-tube 4–6 mm. long; petals purple, 2–3 cm. long; stamens short, nearly equal; stigma-lobes purple, linear-oblong; capsule 2–3 cm. long, somewhat bicostate on the sides, pubescent.

Occasional in open grassy places in the foothills.

3. *G. bottae* Spach. Stems erect, 3–6 dm. high, nascent parts puberulent, otherwise glabrous; leaves linear-lanceolate, glabrous or sparsely puberulent, denticulate; flowers abruptly reflexed in the bud; well developed bud about 2 cm. long, acutish; petals pink, often paler below and specked with purple, mostly 2.5–3 cm. long, cuneate, tapering from the truncate apex to the sessile base; stigma-lobes broadly obovate, usually purple; capsule linear, about 4 mm. long, not at all costate, its beak short and nearly as broad, cinereous with a short appressed pubescence.

Common in the Santa Monica Mountains and in the foothills about Los Angeles. *G. pulcherrima* Greene is apparently the same, Dr. Greene having evidently confused this species with the next.

4. *G. dudleyana*. Abrams. Stems erect, simple below, more or less branched above, 3–6 dm. high; herbage puberulent throughout with rather short curved hairs; leaves linear-lanceolate, entire or rarely faintly and remotely repand-denticulate; flower-buds drooping, elliptic-ovate, tapering above to a rather long acuminate tip, 10–15 mm. long; calyx-tube 1.5–2 mm. long; petals obovate, truncate at the apex, abruptly tapering near the base to a short (2 mm. long) and narrow claw, 15–20 mm. long, pink, often with purple specks below the middle; stamens slightly unequal, the longest 12 mm. long, anthers yellow; style filiform, glabrous, 12–14 mm. long; stigma-lobes oblong, 1.5 mm. long, yellow; capsule linear, abruptly tapering at base to a short pedicel, and at the apex to a slender beak, about 2.5 cm. long, each cell laterally bicostate.

Frequent in the upper portions of the chaparral belt of the San Gabriel Mountains.

5. *G. epilobioides* (Nutt.) Wats. Stems slender, somewhat branched above, 3–5 dm. high, glabrous or nearly so; leaves linear or linear-lanceolate; calyx-tube 4–6 mm. long; petals cream-colored or rarely faintly tinged with rose, 8–10 mm. long, rounded at apex or somewhat acutish; stigma-lobes short; capsule 15–25 mm. long, acuminate at apex, attenuate at base to a short base or nearly sessile, not costate.

Common in the chaparral belt, especially toward the coast. First collected by Nuttall at San Diego.

7. OENOTHERA L.

Annual or biennial caulescent herbs with mostly erect stems. Leaves alternate, undulate or toothed, sessile or somewhat petioled. Flowers yellow, nocturnal, in terminal spikes. Calyx-tube elongated, terete, gradually enlarged at the throat; the segments narrow, the tips free in the bud. Petals 4, spreading. Stamens many, equal in length; filaments filiform; anthers linear. Ovary 4-celled; styles united, filiform; stigma 4-cleft; ovules numerous, in 2 or more rows, horizontal. Capsule 4-celled, 4-angled, more or less tapering, loculicidally dehiscent. Seeds more or less prismatic-angled.

1. *O. hookeri* T. & G. Biennial; stem reddish, stout, angular, 1–2 m. high, herbage canescently pubescent and somewhat villous; leaves lanceolate, sessile, acute, obscurely denticulate, calyx-tube 3 cm. long; the segments nearly as long; petals about 4 cm. long, obcordate, pale yellow, turning to rose color; stigma-lobes yellow, spreading; capsule 2 cm. long, sessile, canescent with a fine close pubescence; seeds brown, 1 mm. long, faintly striate, not wing-angled. (*Oenothera biennis hirsutissima* Gray.)

Frequent in moist ground, usually along streams, both in the valleys and mountains. May–August.

8. **ANOGRA** Spach.

Low caulescent herbs, the stems often with papery bark. Leaves alternate, entire or usually toothed. Flowers drooping in the bud, perfect, white or pink, usually axillary, diurnal. Calyx-tube elongated, gradually enlarged upward, calyx-lobes narrow, becoming reflexed. Stamens 8, equal in length; filaments filiform; anthers linear. Ovary elongated 4-celled; styles united, filiform; stigma deeply 4-cleft; capsules spreading or ascending, 4-angled, loculicidal. Seeds ascending in 1 row, terete, not angled.

1. **A. californica** (Wats.) Small. Stems decumbent from a running rootstock, 1–2 dm. long, branching; herbage hoary-pubescent and more or less villous; leaves narrowly oblanceolate, sinuately toothed or pinnatifid, 6–8 cm. long; ovary and calyx villous; calyx-tube about 2 cm. long; petals white turning pink, lobed at apex, with a rounded sinus; capsule 4–6 cm. long. (*Oenothera californica* Wats.)

Occasional in sandy soil. Near Santa Ana, *Geis*; Cucamonga.

9. **EULOBUS** Nutt.

A smooth erect annual with alternate leaves and middle-sized flowers; sessile along the virgate branches. Calyx-tube scarcely at all produced beyond the ovary, the limb 4-parted, reflexed. Petals 4, rhombic-ovate, sessile, pale yellow turning reddish. Stamens 8; anthers oblong, attached near the middle. Ovary 4-celled; stigma capitate. Capsule linear, elongated, 4-angled, 4-valved, imperfectly 4-celled, reflexed. Seeds numerous, ovate-oblong, naked.

1. **E. californicus** Nutt. Stem 3–10 dm. high, rather stout, simple or with a few spreading virgate branches; leaves linear, 2.5–5 cm. long, sinuately pinnatifid, with numerous unequal divaricate acute teeth; calyx-tube prolonged less than 1 mm. above the ovary; petals 8–10 mm. long, pale yellow or nearly white; capsule 6–10 mm. long; seeds 3-angled.

Frequent in the chaparral belt throughout our range.

10. **SPHAEROSTIGMA** F. & M.

Annual or perennial herbs with erect branching or spreading stems, the bark often exfoliating and shiny. Leaves alternate, entire or dentate, petioled or sessile. Flowers solitary in the axils or in terminal spikes, usually yellow, rarely white or rose color, often with a brownish

spot at the base, turning green or reddish in age. Stamens 8; anthers versatile, oblong. Style filiform; stigma capitate. Ovary 4-celled, usually linear, 4-angled, often contorted, membranous, sessile, dehiscent loculicidally. Seeds in 1 row in each cell.

Flowers axillary, yellow.

Capsules more or less contorted.

Petals 8 mm. long or more.

Biennial or perennial from a tap-root, maritime species.

Leaves silvery-canescens with a short appressed pubescence.

1. *S. viridescens*.

Leaves more or less hirsute and canescens, not silvery.

2. *S. spirale*.

Annuals.

Capsule 2 mm. wide or more, not attenuate into a long beak.

3. *S. bistortum*.

Capsule 1-1.5 mm. wide, attenuate into a long beak.

4. *S. veitchianum*.

Petals 5 mm. long or less.

Lower stem leaves ovate.

5. *S. hirtellum*.

Lower stem leaves linear.

6. *S. micranthum*.

Capsules not contorted.

Petals 3 mm. long.

7. *S. contortum*.

Petals 8-10 mm. long.

8. *S. campestre*.

Flowers spicate, white or pink.

9. *S. alyssoides*.

1. *S. viridescens* (Lehm.) Walp. Silvery-canescens, with a short and dense appressed pubescence; branches prostrate or ascending, 3-8 dm. long, somewhat woody; leaves rather thick, spatulate-oblong or linear-oblong to ovate-cordate, sessile, usually entire, 2 cm. long or more; petals 12-16 mm. long, turning greenish in age; anthers linear-oblong, fixed below the middle; capsule short-pubescent. (*Oenothera viridescens* Lehm.; *O. cheiranthifolia suffruticosa* Wats.)

Common on the sand-dunes along the seashore. Flowering nearly throughout the year.

2. *S. spirale* (Lehm.) Walp. Stems herbaceous, prostrate or ascending, 3-6 dm. long; leaves rather thick, spatulate to ovate-cordate, the lowest short-petioled, entire or dentate, more or less hirsute; calyx pubescent; petals 8-12 mm. long, turning red or tawny in age; anthers linear-oblong, fixed in the middle; capsule acutely 4-angled, hirsute. (*O. cheiranthifolia* of Bot. Cal.)

With the last but less common.

3. *S. bistortum* (Nutt.) Walp. Stems prostrate or ascending, 2-5 dm. long; leaves thinner, narrowly lanceolate to ovate, the upper mostly sessile and rounded or cordate at base, all denticulate or dentate; calyx hirsute; petals 8-14 mm. long; capsule 8-18 mm. long, 2 mm. wide or more; beak very short. (*O. bistorta* Nutt.)

Very common in sand-washes about San Diego, where it was first collected by Nuttall; extending north to Santa Barbara.

4. **S. veitchianum** (Hook.) Small. Stems decumbent or ascending, 2-4 dm. long; leaves linear-oblong, lanceolate or ovate, more or less hirsute; calyx hirsute; petals 10-15 mm. long; capsule 2.5-4 cm. long, 1-1.5 mm. wide, attenuate into a long beak. (*O. bistorta veitchiana* Hook.)

Very common in all our valleys in sandy soil.

5. **S. hirtellum** (Greene) Small. Stems stoutish, erect, simple or with a few ascending branches from the base, 15-30 cm. high, the herbage purplish, short-hirsute; radical leaves oblanceolate, denticulate; stem leaves ovate, sessile, coarsely toothed and more or less undulate-criped; petals 4 mm. long or more; capsule hirsute, narrow, attenuate upwards, once or twice coiled. (*O. hirtella* Greene.)

Frequent in the foothills and mountains.

6. **S. micranthum** (Hornem.) Walp. Stems prostrate or ascending, 1-4 dm. long; leaves all narrowly oblanceolate to linear-oblong, hirsute, 3-5 cm. long, dentate, acutish, somewhat undulate; petals 2-4 mm. long, often emarginate; capsule 4-angled, contorted, sparsely hirsute. (*O. micrantha* Hornem.)

Frequent on the sand-dunes along the seashore, but not strictly maritime as reported by some, for it is also frequent in sandy soil in all the valleys.

7. **S. contortum** (Dougl.) Walp. Slender, erect-spreading, 15-45 cm. high, somewhat pubescent with short appressed or incurved white hairs; leaves about 12 mm. long, linear-lanceolate, acutish, denticulate; subsessile; petals 3 mm. long, turning deep red; anthers roundish, basifixed; capsule about 2 cm. long, sessile, straight or arcuate, scarcely attenuate at apex. (*O. strigulosa* T. & G.)

Common in sandy soil in the valleys and foothills toward the coast.

7a. **S. contortum greenei** Small. Stems erect, usually simple below, more or less hirsute pubescent and somewhat viscid, otherwise as the type. (*O. strigulosa epilobioides* Greene.)

The common form in the interior valleys and foothills.

8. **S. campestre** (Greene) Small. Branched from the base, 15-30 cm. high and as broad, more or less hirsute-pubescent throughout; leaves linear-lanceolate, 2.5 cm. long, dentate; petals 8-10 mm. long, turning brick-red; anthers linear-oblong, 1.5 mm. long, fixed toward the middle and versatile; pods more than 2.5 cm. long, narrowly linear, slightly incurved with a slender beak. (*O. dentata* Wats. not Cav.)

Hills and mountains of San Bernardino County; common in the San Joaquin Valley.

8a. **S. campestre parishii** Abrams. Much resembling the type in habit; cinereous throughout with a short appressed pubescence, not at all hirsute; petals about 8 mm. long; pods very slender, often much contorted.

Plains about San Bernardino, *Parish*.

9. **S. alyssoides** (H. & A.) Small. Erect or with few ascending

branches from the base, 1–3 dm. high, canescently puberulent; leaves oblong-lanceolate to oblanceolate, narrowed into a slender petiole, repand-denticulate or entire, 2.5–5 cm. long; spike elongated, many-flowered; petals rose-purple, 4–8 mm. long, capsule 2–5 cm. long, slender, attenuate above, contorted; seeds ash color, minutely pitted. (*O. alyssoides* H. & A.)

Occasional in the chaparral belt. Echo mountain, *Davidson*; Santa Paula; Seske creek.

10. GAYOPHYTUM Juss.

Erect very slender diffusely branching annuals, with alternate linear entire leaves and axillary white or purplish flowers. Calyx-tube not prolonged above the ovary, the 4-parted deciduous limb reflexed. Petals 4. Stamens 8, the alternate ones usually minute and sterile; filaments filiform; anthers subglobose, fixed near the middle. Ovary oblong or linear, compressed, 2-celled; stigma capitate or clavate. Capsule membranous, clavate, 4-valved. Seeds few-many, in 1 row in each cell, smooth, naked, mostly oblong.

Seeds canescent with appressed pubescence.

1. *G. lasiospermum*.

Seeds glabrous.

Capsules on filiform pedicels.

2. *G. ramosissimum*.

Capsules subsessile.

3. *G. caesium*.

1. *G. lasiospermum* Greene. Stems 2–4 dm. high, loosely dichotomous with filiform branches, the upper leaves and inflorescence canescent with appressed or spreading hairs; petals about 1 mm. long; capsules erect, about equaling the subtending leaves, narrowly linear or slightly clavate, scarcely torulose; seeds erect, finely appressed-pubescent.

Open pine forests in dry situations; North Baldy; San Jacinto Mountains.

2. *G. ramosissimum* T. & G. Stem intricately dichotomous with filiform branches 15–60 dm. high, glabrous below, appressed canescent above or rarely with spreading hairs throughout; leaves mostly narrow, usually appressed against the branches; petals nearly white, turning rose color, 1–2 mm. long; stigma about 0.4 mm. in diameter; capsule about 1 mm. thick, oblong to subclavate, often torulose, erect or refracted on filiform pedicels; seeds nearly erect in a single series, papillate, 0.5 mm. broad, 1.3 mm. long.

Common in the coniferous forests in all the mountains.

3. *G. caesium* T. & G. Stems with mainly erect or ascending branches, 1–3 dm. high, leafy, glabrous or pilose; petals scarcely 1 mm. long; capsules nearly sessile, erect, narrowly linear; seeds smooth.

Open pine forests in dry situations; North Baldy and Cold Water Canyon, San Gabriel Mountains.

**Family 73. HALORAGIDACEAE. WATER-
MILFOIL FAMILY.**

Perennial or rarely annual herbs, mainly aquatic, with alternate or verticillate leaves, the submerged ones often pectinate-pinnatifid. Flowers perfect or monœcious or diœcious, axillary in interrupted spikes, solitary or clustered. Calyx-tube adnate to the ovary, its limb entire or 2-4-lobed. Petals small, 2-4 or none. Stamens 1-8. Ovary ovoid-oblong or short-cylindric, 2-8-ribbed or winged, 1-4-celled; styles 1-4; stigmas papillose or plumose. Fruit a nutlet or drupe, compressed, angular, ribbed or winged, indehiscent, of 2-4 1-seeded carpels. Endosperm fleshy; cotyledons minute.

Ovary 1-celled.

1. HIPPURIS.

Ovary 4-celled.

2. MYRIOPHYLLUM.

1. HIPPURIS L.

Aquatic herbs with simple erect stems and verticillate entire leaves. Flowers small, axillary, perfect or sometimes neutral or pistillate. Limb of the calyx minute, entire. Petals none. Stamens 1, inserted on the margin of the calyx. Style filiform, stigmatic its whole length, ying in a groove of the anther. Fruit a small 1-celled, 1-seeded drupe.

1. *H. vulgaris* L. Stem slender, glabrous, 2-5 dm. high; leaves linear or lanceolate, acute, sessile, 1-20 mm. long, in crowded verticils of 6-12; stamens with a short thick filament and comparatively large 2-celled anthers, dehiscent by lateral slits; seeds ovoid; stigma persistent.

Not known within our limits, but occurring in the San Bernardino Mountains.

2. MYRIOPHYLLUM L.

Aquatic herbs with verticillate or alternate leaves, the emersed ones entire, dentate or pectinate, the submerged ones pinnatifid into capillary segments. Flowers axillary, often interrupted-spicate, commonly monœcious, 2-bracted. The upper flowers generally staminate with very short calyx-tube, the limb of this 2-4-lobed or wanting; petals 2-4; stamens 4-8. Intermediate flowers often perfect. The lower pistillate, the calyx more or

less deeply 4-grooved, with or without minute lobes; ovary 2-4-celled; ovules 1 in each cell, pendulous; styles 4, short, often plumose. Fruit splitting at maturity into 4 bony, 1-seeded, indehiscent carpels.

1. *M. spicatum* L. Submerged leaves in whorls of 4's and 5's, dissected into capillary divisions; floral leaves ovate, entire or serrate, usually shorter than the flowers or sometimes none; spike 2.5-7.5 cm. long; petals 4, deciduous; stamens 8; fruit about 2 mm. long and 3 mm. thick; carpels rounded on the back, with a deep groove between them, smooth or rarely slightly rugose.

Occasional in deep pools or lakes in all the mountains.

Family 74. ARALIACEAE. GINSENG FAMILY.

Herbs, shrubs or trees, with alternate or verticillate rarely opposite leaves, and perfect or polygamous, variously clustered flowers. Calyx-tube adnate to the ovary, its limb truncate or toothed. Petals usually 5, valvate or slightly imbricate, sometimes cohering together, inserted on the margin of the calyx. Stamens as many as the petals and alternate with them, rarely none, inserted on the epigynous disk; filaments filiform or short; anthers introrse. Ovary inferior, 1-several-celled; styles as many; ovules 1 in each cell, pendulous, anatropous. Fruit a berry or drupe. Seeds flattened or somewhat 3-angled; the testa thin; endosperm copious; embryo small.

1. ARALIA L.

Perennial herbs or shrubs, with alternate digitate or compound leaves, and small flowers in a mostly simple umbel, these either solitary, racemed or paniced. Pedicels jointed. Bracts small. Calyx 5-toothed or entire. Petals 5, ovate, slightly imbricate. Stamens 5. Disk depressed or rarely conical. Ovary 2-5-celled; styles free or united at base, becoming divaricate; stigmas terminal. Fruit laterally compressed, becoming 3-5-angled, fleshy externally; endocarp chartaceous.

1. *A. californica* Wats. (CALIFORNIA SPIKENARD.) Herbaceous, unarmed and nearly glabrous, stout, 2-4 m. high, from a large thick root; leaves bipinnate or the upper pinnate, with 1-2 pairs of leaflets, these cordate-ovate, 10-20 cm. long or more,

shortly acuminate, simply or doubly serrate with short acute teeth; uppermost leaves ovate-lanceolate; umbels in loose, terminal and axillary, compound or simple racemose panicles which are 3-6 dm. long, more or less glandular-tomentose; rays numerous, 8-12 mm. long; involucre of several linear bractlets; flowers 3-4 mm. long; disk and stylopodium obsolete; styles united to the middle; fruit about 4 mm. long, reddish, becoming nearly black.

Frequent along streams above 2000 feet. May-July.

Family 75. AMMIACEAE. CARROT FAMILY.

Herbs with alternate decompound, compound or sometimes simple leaves, the petioles often dilated at the base, the stems usually hollow. Stipules none or rarely present and minute. Flowers small in compound or simple umbels or rarely in heads, often polygamous. Umbels and umbellets commonly involucre or involu-cellate. Calyx-tube wholly adnate to the ovary, its margin truncate or 5-toothed. Petals 5, inserted on the margin of the calyx, usually with an inflexed tip. Stamens 5, inserted on the epigynous disk; filaments filiform; anthers versatile. Ovary inferior, 2-celled; styles 2, filiform, distinct, often borne on a conic or depressed stylopodium; ovules 1 in each cell, pendulous, anatropous. Fruit dry, composed of 2 carpels, separating at maturity along the plane of their contiguous faces (*com-missure*); either flattened laterally (at right angles to the commissure), or dorsally (parallel with the commissure), or nearly terete. Carpels after parting supported on a slender axis (*carpophore*), more or less ribbed or winged. Pericarp membranous or corky-thickened, usually containing oil-tubes between the ribs and on the commissural side. Seeds usually adnate to the pericarp, their inner faces flat or concave; endosperm cartilaginous; embryo small. (*Umbelliferae*.)

Flowers in dense, usually rather spiny heads. 4. ERYNGIUM.
Flowers umbellate.

Fruit covered with hooked bristles.

3. SANICULA.

Fruit with bristles only on the ribs.

- Bristles barbed at tip.
- Bristles short, neither hooked nor barbed.
- Bristles hooked.
- Fruit not bristly.
- Oil-tubes obsolete or obscure.
 - Leaves decom-pound.
 - Leaves simple.
 - Fruit strongly flattened laterally.
 - Fruit not strongly flattened laterally.
- Oil-tubes distinct.
 - Fruit strongly flattened dorsally.
 - Flowers white.
 - Caulescent.
 - Acaulescent or nearly so.
 - Flowers yellow.
 - Plants leafy-stemmed.
 - Plants with mostly basal leaves.
 - Leaflets large, sharply toothed.
 - Leaflets narrow or small, not sharply toothed.
- Fruit not strongly flattened dorsally, usually flattened laterally.
 - Oil-tubes solitary in the intervals.
 - Stylopodium conical.
 - Flowers yellow.
 - Flowers white.
 - Leaflets, at least the upper, linear or filiform.
 - Leaflets broader.
 - Stylopodium flat or wanting.
 - Ribs thick and corky.
 - Dorsal ribs filiform.
 - All the ribs prominent and corky.
 - Ribs obscure or obsolete.
 - Oil-tubes more than 1 in the intervals.
 - Stylopodium conic.
 - Stylopodium flat or wanting.
 - Seed-face involute, inclosing a central cavity.
 - Seed face deeply sulcate.
 - Seed-face plane.

22. DAUCUS.

5. OSMORHIZA.

6. CAUCALIS.

8. CONIUM.

1. HYDROCOTYLE.

2. BOWLESIA.

18. SPHENOSCIADIUM.

19. COGSWELLIA.

21. PASTINACA.

20. EURYPTERA.

19. COGSWELLIA.

17. FOENICULUM.

13. CARUM.

12. CICUTA.

16. OENANTHE.

11. APIUM.

7. APIASTRUM.

15. BERULA.

10. DRUDEOPHYTUM.

9. DEWEYA.

14. SIUM.

1. **HYDROCOTYLE** L. PENNYWORT.

Low herbaceous perennials growing in or near water, with slender creeping stems, orbicular peltate or reniform leaves, and small white flowers in simple or proliferous umbels, without involucre. Calyx-teeth minute or obsolete. Fruit more or less orbicular, strongly flattened laterally. Carpel with 5 primary ribs, broad or filiform. Oil-tubes wanting or obscure.

1. **H. umbellata** L. Descending branches of the rootstocks with round tubers; leaves orbicular-peltate, crenate; peduncles as long as the petioles; umbels many-flowered, simple, rarely slightly proliferous; pedicels 4–12 mm. long; fruit with a thin pericarp except at the broad thick corky dorsal and lateral ribs, strongly notched, 2 mm. long, about 3 mm. broad, with dorsal ribs prominent but obtuse.

Frequent on borders of marshes and streams. Apparently more common in the interior valleys.

2. **H. ranunculoides** L. Floating or creeping in mud; leaves round-reniform, 3–7-cleft, with crenate lobes; peduncles much shorter than the petioles, reflexed in fruit; umbel capitate, 5–10-flowered; fruit corky, thickened throughout, ribs all filiform, rather obscure.

Common in pools or slow-running streams, especially toward the coast; extending south at least as far as San Diego.

2. **BOWLESIA** R. & P.

Slender branching annuals with stellate pubescence, opposite simple lobed leaves, scarious lacerate stipules, and simple few-flowered umbels of white flowers on axillary peduncles. Calyx-teeth rather prominent. Fruit broadly ovate with narrow commissure and stellate pubescence. Carpels turgid, becoming depressed on the back, with neither ribs nor oil-tubes; the whole dorsal region inflated, the seed-cavity being on the commissural side of the carpel. Seed flattened dorsally, the face and back plane or convex.

1. **B. septentrionalis** C. & R. Stems weak, 0.5–6 dm. long, dichotomously branching; leaves thin, cordate to reniform, 1.5–3 cm. broad, 3–5-lobed, the lobes entire or toothed, on long slender petioles; umbels 1–4-flowered, on short peduncles; fruit about 2 mm. long, sessile or nearly so. (*B. lobata* of recent authors, not of R. & P.)

Common throughout our range in the valleys and foothills, usually growing on shaded slopes.

3. *SANICULA* L.

Smooth perennial herbs with almost naked or few-leaved stems, palmate or sometimes pinnate leaves with more or less pinnatifid or incised lobes, involucre and involucels, and greenish yellow or purple flowers in irregularly compound few-rayed umbels. Calyx-teeth somewhat foliaceous, persistent. Fruit subglobose, densely covered with hooked bristles or tuberculate. Carpels without ribs. Stylopodium wanting. Oil-tubes mostly large, 5 (3 dorsal and 2 commissural) or in ours 3—many and irregularly distributed. Seed-face plane to deeply concave or sulcate.

Leaves palmately divided.

Fruit pediceled or stipitate.

Leave-rachis not conspicuously winged. 1. *S. menziesii*.

Leave-rachis conspicuously winged. 2. *S. arguta*.

Fruit sessile.

Leaves with main divisions confluent at base. 3. *S. laciniata*.

Leaves with main divisions distinct at base. 4. *S. nevadensis*.

Leaves pinnately divided.

Flowers purple; leaf-rachis winged. 5. *S. bipinnatifida*.

Flowers yellow; leaf-rachis not winged.

Stems not arising from tubers. 6. *S. bipinnata*.

Stems arising from tubers. 7. *S. tuberosa*.

1. *S. menziesii* H. & A. Stem solitary, erect, 3–10 dm. high, branching; leaves round-cordate, 5–10 cm. broad, very deeply 3–5-lobed, the broad segments sharply toothed or somewhat cleft, the teeth bristle-tipped; upper leaves more narrowly lobed and laciniately toothed; rachis scarcely winged; umbel with 3–4 slender rays; involucre of 2–3 small leaf-like bracts; involucels of 6–8 small entire bractlets; flowers yellow, the sterile ones short-pedicelled; fruit sessile but distinctly stipitate, obovate, 2–4 mm. long, covered with strong bristles; seed-face sulcate.

Frequent in the foothills in moist woods.

2. *S. arguta* Greene. Stems more or less branching, 1.5–4.5 dm. high, from a thickened rootstock; leaves palmately 5-parted, the middle division elongated and distinct, all the divisions more or less palmately lobed and toothed, decurrent upon the rachis, forming a broad toothed wing, teeth spinosely pointed; umbel 3–5-rayed; involucre of leaf-like bracts; involucels of linear to linear-lanceolate spinosely pointed bractlets; flowers yellow, the sterile ones on pedicels 3–4 mm. long; fruit obovate, tapering into a stipitate base, somewhat naked below, more bristly above, 6 mm. long.

Frequent on grassy hillsides and mesas, extending from Santa Barbara to San Diego.

3. *S. laciniata* H. & A. Usually slender, branching from the base, 1-6 dm. high; leaves broadly ovate-orbicular in outline, from slightly 3-lobed to deeply 3-parted, the divisions from toothed to laciniately cut, with bristle-tipped teeth; umbel 3-5-rayed; involucre of leaf-like bracts; involucels of small apiculate bractlets; flowers yellow; fruit orbicular, not at all stipitate, 3 mm. long.

Rather common on hillsides and in open places in the chaparral belt.

4. *S. nevadensis* Wats. Low, with very short stems, the numerous stoutish peduncles arising from near the base, 2 dm. high or less; leaves ternate, the divisions oblong-ovate, 3-5-lobed, the segments lobed or toothed; umbels with 3-10 rays; involucre of pinnatifid leaf-like bracts; involucels of small, oblong, acute, more or less united bractlets; fruiting rays 1.5-3.5 cm. long; flowers yellow, the sterile ones on pedicels 2-3 mm. long; fruit bristly all over, 3 mm. long; seed-face concave.

Occasional in the upper portions of the chaparral belt and pine belt. Santiago Peak, Santa Ana Mountains; San Bernardino Mountains.

5. *S. bipinnatifida* Dougl. Stems 3 dm. or more high, from a thickened rootstock, with usually a cluster of leaves at the base, and 1-3 leaves above; leaves pinnately 3-7-parted, the divisions incisely toothed or lobed, decurrent on the rachis, and forming a toothed wing; teeth acute or slightly pointed; umbel with 3-4 elongated rays; involucre of leaf-like bracts; involucels of small narrow acute bractlets; flowers purple, in dense heads, the sterile ones pedicelled; fruit bristly all over, 3 mm. long; seed-face broadly concave with a prominent central longitudinal ridge.

Occasional on grassy hillsides.

6. *S. bipinnata* H. & A. Slender, 2-4 dm. high, from a slender fusiform root; leaves twice or thrice pinnate, with divisions not at all decurrent on the rachis, cuneate-oblong to ovate, incisely and mucronately toothed; umbel 3-4-rayed; involucre of leaf-like bracts; involucels of a few small bractlets more or less united; flowers yellow; fruit 3 mm. long, with strong tubercles tipped with short hooked bristles; seed-face deeply sulcate, sometimes inclosing a central cavity, with a central longitudinal ridge.

Los Angeles River, San Fernando Valley; Oak Knoll, Pasadena.

7. *S. tuberosa* Torr. Stems 1-6 dm. high from a small globose tuber; leaves twice or thrice pinnate, usually very finely divided, ultimate segments very small; umbel 1-4-rayed; bracts leaf-like; bractlets unequal, united; flowers yellow, the sterile ones on long pedicels; fruit broader than long, rather strongly flattened laterally for the genus, 2 mm. long, tuberculate and not at all bristly; seeds somewhat laterally flattened, with plane face.

Occasional in open places in the foothills.

4. ERYNGIUM L.

Glabrous perennials, with often rigid coriaceous spinosely toothed or divided leaves, and white or blue flowers

sessile in dense bracteate heads. The outer bracts form the involucre, the inner bractlets intermixed with the flowers represent the involucels. Sepals prominent, rigid, persistent. Fruit ovoid, flattened laterally, covered with hyaline scales or tubercles. Carpels with ribs obsolete. Stylopodium wanting; styles short or long, often rigid. Oil-tubes mostly 5, 3 dorsal and 2 commissural. Seed-face plane.

1. *E. parishii* C. & R. Stems slender, much branched, erect or spreading, 1-4 dm. long; basal leaves simple or pinnate, the blades or segments laciniate-toothed or cleft, tapering into a long more or less spinosely toothed petiole; inflorescence beginning near the base, diffusely branching; the heads on very short peduncles, nearly globose, about 6 mm. long; bracts very narrow, rigid, 12-18 mm. long, with a few spinose bristles at the base, not at all scarious-margined; bractlets about the size of the bracts, short, scarious-margined below, broadening upward to a short lobe on each side, the margined base inclosing the fruit and falling with it; sepals ovate, scarious-margined, 1.5 mm. long, tapering to a cuspidate bristly tip; styles longer than the sepals.

In low heavy ground toward the coast. First collected by Parish near Oceanside.

5. OSMORHIZA Raf.

Glabrous or hirsute perennials from thick aromatic roots, with ternately decompound leaves and white or purple flowers in few-fruited umbels. Calyx-teeth obsolete. Fruit linear to linear-oblong, more or less attenuate at base, acute or beaked at apex, glabrous or bristly on the ribs. Carpels slightly or not at all flattened dorsally. Stylopodium conic, sometimes depressed. Oil-tubes obsolete in mature fruit, often numerous in young fruit. Seed-face from slightly concave to deeply sulcate.

1. *O. brachypoda* Torr. Stems rather stout, 3-9 dm. high, pubescent or sometimes glabrous; leaves ternately compound; leaflets 2-3 cm. long, acute, laciniately lobed or toothed; umbel 1-6-rayed; involucre and involucels of linear bracts, the latter equaling or exceeding the flowers; rays 3.5-10 cm. long; pedicels 1-2 mm. long; fruit 12-16 mm. long, 4 mm. wide, short-attenuate at base, rough-bristly on the very prominent ribs; stylopodium and style 3 mm. long; the former broad and somewhat depressed; seed-face very concave, nearly inclosing a central cavity.

Occasional in all the mountains on shady slopes.

6. CAUCALIS L.

Mostly hispid annuals with pinnately dissected leaves and white flowers. Calyx-teeth prominent. Fruit ovate

or oblong, flattened laterally. Carpel with 5 filiform bristly primary ribs and 4 prominent winged secondary ones, with barbed or hooked bristles. Stylopodium thick, conic. Oil-tubes solitary in the intervals under the secondary ribs, 2 on the commissural side. Seed-face deeply sulcate.

1. *C. microcarpa* H. & A. Erect, slender, 1-3 dm. high, more or less hispid; leaves much dissected, the segments small; umbels at the ends of the stem and branches, very unequally 3-6-rayed; involucre of foliaceous divided bracts; involuclers of entire or somewhat divided bractlets; rays slender, 7.5 cm. long or less; pedicels very unequal; fruit oblong, 4-6 mm. long, armed with rows of hooked prickles; the primary lateral ribs near margin of commissural face.

Frequent in sandy or stony places in the valleys and mountains below the pine belt.

2. *C. nodosa* Hudson. Stems erect with few branches, retrorsely scabrous; leaves pinnate; leaflets bipinnately dissected; umbels scattered along the stems opposite the leaves on very short peduncles, simple or with supplementary short proliferous umbel; fruit 1-4 mm. long, the outside of the umbel with the exterior carpel densely covered with hooked bristles, the inner carpel as well as the inner fruits smooth or with tubercles.

Oak Knoll, near Pasadena, *McClatchie*.

7. APIASTRUM Nutt.

Very slender smooth branching annuals, with finely dissected leaves having filiform or linear segments, and small white flowers in naked unequally few-rayed umbels. Calyx-teeth obsolete. Fruit ovate or cordate, with obscure or obsolete ribs, more or less tuberculate. Carpel with thin pericarp. Stylopodium minute, depressed; styles short. Oil-tubes solitary in the intervals and beneath the ribs, 2 on the commissural side. Seed-face narrowly concave or sulcate.

1. *A. angustifolium* Nutt. Slender, 0.5-3 dm. high, usually much branched; leaves 2.5-5 cm. long, biternately or triternately divided, with linear or nearly filiform segments; umbels sessile; rays from 2.5 cm. long to wanting; pedicels 12 mm. long or wanting; fruit with narrow commissure, cordate in outline, 1 mm. long.

Common in sandy soil in the foothills and valleys.

8. CONIUM L. POISON HEMLOCK.

Tall biennial glabrous herbs with spotted stems, pinnately decomposed leaves, and small white flowers in compound many-rayed umbels. Involucre and involu-

cels of ovate acuminate bracts. Calyx-teeth obsolete. Fruit broadly ovate, glabrous, somewhat flattened laterally. Carpels strongly many-ribbed. Large oil-tubes none, but with a layer of oil-secreting tissue next the deeply concave seed.

1. *C. maculatum* L. Erect, much branched, 6–15 dm. high; lower and basal leaves petioled, the upper sessile or nearly so, all pinnately dissected, the leaflets ovate in outline, thin, the ultimate segments dentate or incised; petioles dilated and sheathing at the base; umbels 2.5–7.5 cm. broad; rays slender, 2.5–4 cm. long; pedicels filiform, 4–6 mm. long in fruit; fruit 3 mm. long, its ribs very prominent when dry.

Occasional in waste places, especially in damp ground.

9. DEWEYA T. & G.

Caulescent plants with simply pinnate leaves, mostly no involucre, involucels of few linear bractlets, and yellow flowers. Calyx-teeth prominent. Fruit oblong, flattened laterally, glabrous. Carpel with 5 prominent very acute ribs. Stylopodium none. Carpophore divided. Oil-tubes several in the intervals and on the commissural side. Seeds nearly terete, the face deeply sulcate.

1. *D. arguta* T. & G. Glabrous, 3–7.5 dm. high, rarely acaulescent; leaves simply pinnate; petioles of the lowest pair of leaflets sometimes prominent, giving a divaricate appearance; leaflets 5–7, ovate, 2.5–7.5 cm. long, the lowest often subcordate, finely and sharply mucronate-serrate, the terminal and the lowest often 3-lobed; umbel 12–16-rayed; rays 5–9 cm. long; pedicels short, 3–10 mm. long; fruit oblong, smooth, 8 mm. long; oil-tubes 3–5 in the intervals, 4–6 on the commissural side. (*Velaea arguta* C. & R.)

Frequent in dry open ground in the chaparral belt.

10. DRUDEOPHYTUM C. & R.

Caulescent or acaulescent plants with usually ternately compound leaves and yellow flowers. Calyx-teeth evident or wanting. Fruit orbicular, flattened laterally, glabrous or pubescent. Carpel with 5 slender filiform ribs. Stylopodium none. Carpophore variable, oil-tubes several in the intervals and on the commissural side. Seeds nearly terete, the inner face with a narrow and deep sulcus, which enlarges into a central cavity.

1. *D. parishii* C. & R. Glabrous throughout, nearly acaulescent, 3–4 dm. high; leaves thickish, ternate-pinnatifid, the seg-

ments ovate, irregularly cuspidate-toothed and lobed; umbel 20-rayed, with no involucre; bractlets few, setaceous; rays 5–7.5 cm. long; pedicels about 4–7 mm. long; calyx-teeth prominent; fruit oblong, glabrous, 6–7 mm. long; carpophore 2-parted; oil-tubes 3–4 in the intervals, 4–5 on the commissural side. (*Valæa parishii* C. & R.)

Occasional in the Santa Monica and San Gabriel Mountains.

11. APIUM L.

Annual or perennial glabrous herbs with pinnate or pinnately compound leaves and white or greenish yellow flowers in compound umbels. Calyx-teeth obsolete. Stylopodium depressed or short-conic. Fruit ovate or broader than long, smooth or tuberculate. Carpels mostly with prominent ribs, somewhat 5-angled. Oil-tubes mostly solitary in the intervals, 2 on the commissural side. Seed terete or nearly so.

1. *A. graveolens* L. Glabrous; stems erect, 3–9 dm. high, several-leaved; leaves pinnate, the basal and lower ones long-petioled, the upper short-petioled or nearly sessile, thin, broadly ovate to oval, coarsely toothed and often incised, 1–3 cm. long; umbels opposite the leaves and terminal, 3–7-rayed; involucre and involucels small or none; flowers minute, white, very short-pedicelled; fruit oval, scarcely 1 mm. long, the ribs somewhat winged.

Common in low marshy places.

12. CICUTA L. WATER-HEMLOCK.

Smooth poisonous marsh perennials with pinnately compound leaves and serrate leaflets and white flowers. Calyx-teeth rather prominent. Fruit flattened laterally, oblong to orbicular, glabrous. Carpel with strong flat-tish corky ribs, the lateral ribs largest without strengthening cells. Stylopodium low, sometimes low-conic. Oil-tubes solitary in the intervals, 2 on the commissural side. Seed nearly terete or somewhat dorsally flattened, with face plane to slightly concave.

1. *C. occidentalis* Greene. Stout, 9–18 dm. high; rootstock short, giving rise to slender roots above and a fascicle of thick and elongated ones below; leaves twice pinnate; leaflets from linear-lanceolate to lanceolate, 5–8 cm. long, sharply serrate and conspicuously reticulate beneath; fruit oblong, 3 mm. long, constricted at the commissure, the ribs apparently equal, but laterals largest in section, the intervals broad; oil-tubes large.

Frequent in marshes toward the coast.

13. **CARUM** L.

Smooth erect slender herbs with tuberous or fusiform fascicled roots, pinnate leaves with few linear leaflets, and white flowers. Calyx-teeth prominent for the size of the fruit. Fruit flattened laterally, orbicular to oblong, glabrous. Carpel with filiform or inconspicuous ribs. Stylopodium conic. Oil-tubes large and solitary in the intervals, 2-6 on the commissural side. Seed dorsally flattened, more or less sulcate beneath the tubes, the face plane or slightly concave.

1. **C. gairdneri** (H. & A.) Gray. Stem 3-12 dm. high from fascicled tuberous or fusiform roots; leaves few, usually simply pinnate, with 3-7 linear-filiform leaflets, 5-15 cm. long; umbels 6-15-rayed; bracts several or none; bractlets linear, acuminate; rays 2.5-4 cm. long; fruit broadly ovate or nearly orbicular, 1-2 mm. long, with small ovate calyx-teeth, low conic stylopodium and long slender styles; seed terete.

Occasional along borders of marshes.

2. **C. lemmoni** C. & R. Resembling the last, but fruit oblong, tapering somewhat at base and apex, 3 mm. long and 2 mm. broad, with conspicuous ribs, each of which contains a small group of strengthening cells; calyx-teeth prominent, concealing the stylopodium; styles long and slender.

Occasional in marshes toward the coast.

14. **SIUM** L.

Smooth perennials growing in water or wet places, with pinnate leaves, serrate or pinnatifid leaflets, involucre and involucels of numerous narrow bracts, and white flowers. Calyx-teeth minute. Fruit flattened laterally, ovate to oblong, glabrous. Carpel with prominent corky nearly equal ribs. Stylopodium depressed; styles short. Oil-tubes 1-3 in the intervals. Seed subangular, with plane face.

1. **S. cicutaefolium** Gmel. Stout, 6-8 dm. high; leaflets 3-8 pairs, linear-lanceolate, sharply serrate and mostly acuminate, 5-13 cm. long, lower leaves sometimes submersed and finely dissected; umbel many-rayed; rays 2.5-4 cm. long; pedicels 2-6 mm. long; fruit 3 mm. long, with prominent ribs; oil-tubes 2-6 on the commissural side.

Oak Knoll, *McClatchie*.

2. **S. heterophyllum** Greene. Stems stout, angular and flexuose, 1 m. high; lowest leaves with a single lamina which is rather broadly rhombic-lanceolate, serrate or laciniolate-cleft, 5-20 cm. long; petiole stout, fistulose; the other leaves 3-lobed or divided and passing to

the truly pinnate, with 2 pairs of broadly lanceolate, acute, serrate leaflets; bracts broadly lanceolate, tapering at both ends; fruit 3 mm. long, strongly ribbed.

Near Pasadena, *Davidson*.

15. *BERULA* Hoffm.

Smooth aquatic perennial herbs with simple pinnate leaves, variously cut leaflets, and small white flowers. Calyx-teeth minute. Fruit flattened laterally, nearly round, emarginate at base, glabrous. Carpel nearly globose, with very slender inconspicuous ribs, thick corky pericarp and no strengthening cells. Stylopodium conic. Oil-tubes numerous and contiguous, closely surrounding the seed-cavity. Seed terete.

1. *B. erecta* (Huds.) Coville. Erect, 1.5–9 dm. high; leaflets 5–9 pairs, linear to oblong or ovate; serrate to cut-toothed, often lacinate-lobed, sometimes crenate, 1–7.5 cm. long; umbels many-rayed; rays 5 cm. long or less; bracts usually conspicuous; bractlets narrow; pedicels 4–6 mm. long; fruit scarcely 2 mm. long.

Occasional along watercourses.

16. *OENANTHE* L.

Mostly aquatic glabrous herbs with succulent stems, pinnate or decompound leaves, and usually involucrate umbels of white flowers. Calyx-teeth rather prominent. Fruit globose, slightly flattened laterally if at all, glabrous. Carpel semiterete in section, with broad obtuse corky ribs; laterals the largest; a band of strengthening cells investing the seeds and oil-tubes. Stylopodium very short-conic, with elongated styles. Oil-tubes solitary in the intervals, 2 on the commissural side. Seed sulcate beneath each oil-tube.

1. *O. sarmentosa californica* (Wats.) C. & R. Succulent stems, 6–15 dm. high; leaves ternate and biternate; leaflets approximate, acute or acutish, toothed, often lobed at base, 1–2.5 cm. long; umbels many; bracts few, linear or none; bractlets similar, more numerous; rays 2.5 cm. long or less; pedicels numerous, short; fruit about 4 mm. long, with commissural face as well as ribs very corky.

Frequent along slow-running streams.

17. *FOENICULUM* Adans. FENNEL.

Erect biennial or perennial glabrous herbs, with pinnate compound leaves, linear or capillary leaflets, and compound umbels of yellow flowers. Involucre and in-

volucels none. Calyx-teeth obsolete. Petals obtuse or slightly retuse at the apex. Stylopodium long, conic. Fruit linear-oblong, glabrous, terete or nearly so. Carpels half terete, dorsally flattened, prominently ribbed. Oil-tubes solitary in the intervals. Seed-face flat or slightly concave.

1. **F. foeniculum** (L.) Karst. Perennial, branched, 7–20 dm. high; leaves very finely dissected into capillary segments; petioles broad, clasping; umbels large, 9–25-rayed; rays glaucous, 2.5–7.5 cm. long in fruit; pedicels 2–8 mm. long, slender; fruit about 6 mm. long. (*F. vulgare* Gaertn.)

In waste places and along streets. Native of Europe.

18. SPHENOSCIADIUM Gray.

Nearly simple thick-rooted perennials, with stout stems glabrous up to the tomentose umbel, once or twice pinnate leaves with bladdery dilated petioles, and scarious white or purplish flowers sessile on an enlarged receptacle and forming a compact head. Calyx-teeth obsolete. Fruit flattened dorsally, cuneate-obovate, hirsute. Carpel strongly flattened at base, winged above, the dorsal and intermediate wings narrow, the lateral broader. Stylopodium small and conic or flat in flower. Oil-tubes solitary in the intervals, 2 on the commissural side. Seed-face plane.

1. **S. capitellatum** Gray. Very stout, 3–14 dm. high; leaves large and glabrous; the leaflets oblong to linear-lanceolate, 2.5–5 cm. long, with rather few lacinate teeth or lobes, more or less entire below; umbel equally 4–15-rayed, with globose umbellets of sessile pubescent flowers; bractlets few, deciduous; rays 2.5–5 cm. long; fruit cuneate-obovate, about 5 mm. long.

Cienega, *Davidson*.

19. COGSWELLIA Sprengel.

Acaulescent or short caulescent dry-ground perennials, with fusiform or tuberous roots, ternate, sometimes pinnate to dissected leaves, no involucre, and yellow, white or purple flowers. Calyx-teeth usually obsolete. Fruit strongly flattened dorsally, oblong to orbicular. Carpel with filiform and approximate dorsal and intermediate ribs, and winged laterals coherent until maturity with those of the other carpel; pericarp thin with strengthening cells beneath each rib. Stylopodium wanting. Oil-tubes 1–several in the intervals, rarely obsolete, 2–10 on

the commissural side. Seed dorsally flattened with plane or rarely slightly concave face. (*Peucedanum*.)

Flowers yellow.

Fruit 4–10 mm. long.

1. *C. utriculata*.

Fruit 12–14 mm. long.

2. *C. vaseyi*.

Flowers white.

3. *C. dasycarpa*.

1. *C. utriculata* (Nutt.) Jones. Caulescent or nearly acaulescent, caespitose to 3 dm. high or more, from a more or less thickened root, puberulent or glabrous; petioles very broadly dilated; leaves ternately or pinnately decompose, with ultimate segments narrowly linear 12 mm. or less long; umbel unequally 5–20-rayed; bracts much dilated, mostly obovate, often toothed; rays 5 cm. long or less; pedicels 4–10 mm. long; flowers yellow; fruit broadly elliptic, glabrous, 4–10 mm. long, 2–7 mm. broad, with wings nearly as broad as the body, and prominent dorsal and intermediate ribs; oil-tubes large, solitary in the intervals, 4–6 or sometimes 2–3 on the commissural side, very short accessory ones in the intervals; seed-face somewhat concave.

Frequent on the mesas and grassy foothills.

2. *C. vaseyi* C. & R. Short, caulescent, 15–20 cm. high; slightly pubescent; petioles wholly inflated; leaves small, 2.5–5 cm. long, bipinnate, with the small ovate segments irregularly 3–5-lobed; umbel equally 2–5-rayed; bractlets obovate, petiolulate, toothed; rays 2.5 cm. long; pedicels 2–4 mm. long; flowers yellow; fruit broadly oblong, emarginate, glabrous, 12–14 mm. long, 8 mm. broad, with wings twice as broad as the body, and mostly prominent dorsal and intermediate ribs; oil-tubes solitary in the intervals, 4 on the commissural side.

Frequent in heavy soil on the mesas throughout our range.

3. *C. dasycarpa* (T. & G.) Jones. Very short, caulescent or acaulescent, with several stout peduncles, 1.5–3 cm. long, from a common root, tomentose-pubescent; leaves rather small, pinnately decompose, with numerous short linear segments; umbel somewhat equally 6–15-rayed; bractlets linear to ovate, more or less tomentose; rays 2.5–7.5 cm. long; pedicels 6–10 mm. long; flowers white; fruit nearly orbicular, coarsely pubescent, becoming almost glabrous, 8–14 mm. long, 7–12 mm. broad, with thin membranous wings, broader than the body, and filiform dorsal and intermediate ribs; oil-tubes large and solitary in the intervals (an occasional secondary one in the lateral intervals), 4 on the commissural side; seed deeply sulcate beneath the oil-tubes, with plane face.

Occasional on dry hillsides, especially in the interior region.

20. EURYPTERA Nutt.

Acaulescent or caulescent glabrous perennials, with elongated roots, branching only from the base, leaves once or twice compound, with usually broad sharply toothed leaflets. Flowers yellow. Calyx-teeth minute

or obsolete. Fruit strongly flattened dorsally, orbicular to shortly oblong. Carpel with filiform ribs, and with broadly winged laterals, these often distinct at base and becoming cordate or emarginate, cohering until maturity with those of the other carpel; pericarp thin. Stylopodium wanting; disk impressed. Oil-tubes 1-several in the intervals. Seed strongly dorsally flattened, with plane face.

1. *E. lucida* Nutt. Short, caulescent, glabrous, rather stout, 1.5-5 dm. high; leaves ternate; leaflets broadly cordate, somewhat lobed, coarsely mucronate-toothed, 1-2.5 cm. long; umbel equally 8-15-rayed; bractlets lanceolate; rays 1-5 cm. long; pedicels 12 mm. long; fruit nearly orbicular, emarginate at each end, glabrous, 10-14 mm. in diameter, with wings more than twice as broad as the body, and prominent dorsal and intermediate ribs; oil-tubes solitary in the intervals, 2-4 on the commissural side.

Occasional on dry ground in the chaparral belt in all the mountains.

2. *E. hassei* C. & R. Caulescent, stout, 6 dm. high or more, glabrous and somewhat glaucous, from a long slender woody root; leaves biternate on very long petioles (sometimes 2.5 dm., including petiole); leaflets broadly ovate with cuneate base, irregularly lobed, coarsely mucronate-toothed, 2.5-10 cm. long, becoming 6 cm. broad; umbel long-peduncled, equally 8-18-rayed; bractlets varying from rather short linear-setaceous to oblanceolate, foliaceous, entire or toothed and much exceeding the pedicels; rays 5-10 cm. long; pedicels 12-16 mm. long; fruit as in the last.

"Sierra Madre Canyon," *Hasse*. We have seen no specimens that answer the description of this plant, but forms of the last found in the Santa Monica Mountains seem to approach it.

21. PASTINACA L.

Tall erect mostly biennial branching herbs, with thick roots, pinnate leaves, and compound umbels of yellow flowers. Involucre and involucels commonly none. Calyx-teeth obsolete. Stylopodium depressed. Fruit oval, glabrous, much flattened dorsally; dorsal and intermediate ribs filiform, the lateral winged, coherent with those of the other carpel and forming a broad margin to the fruit. Oil-tubes solitary in the intervals, and 2-4 on the commissural side. Seed very flat.

1. *P. sativa* L. Usually biennial, glabrous or somewhat downy-pubescent, 6-15 dm. high; the root long conic, fleshy; lower and basal leaves petioled, pinnate, often 4.5 dm. long; leaflets rather thin, ovate or oval, obtuse, sessile, lobed or incised and sharply dentate, 2-6 mm. long; upper leaves generally much reduced;

umbels several or numerous, 5–15 cm. broad, 7–15-rayed; the rays slender, 1–5 cm. long; pedicels very slender, 6–12 mm. long in fruit; fruit broad, the dorsal and intermediate ribs not prominent, but the oil-tubes conspicuous.

Rather frequent in marshes, especially toward the coast.

22. DAUCUS L.

Bristly annuals or biennials, with pinnately compound leaves, foliaceous and cleft involucre bracts, entire or toothed bractlets, and usually white flowers in concave umbels which become connivent in fruit. Calyx-teeth obsolete. Fruit oblong, flattened dorsally. Carpel with 5 slender bristles, primary ribs and 4-winged secondary ones, each bearing a single row of prominent barbed prickles. Stylopodium depressed or wanting. Oil-tubes solitary in the intervals, under the secondary ribs, 2 on the commissural side. Seed flattened dorsally, the face somewhat concave or almost plane.

1. *D. pusillus* Michx. Stems mostly simple, papillate, hispid, 2.5–60 cm. high; leaves finely dissected into narrowly linear segments; umbels unequally few-many-rayed, forming a rather compact head; rays 1–3.5 cm. long; pedicels very unequal; fruit 3–5 mm. long.

Frequent in open dry ground in the chaparral belt and on the planes throughout our range.

2. *D. carota* L. (WILD CARROT.) Hispid, usually biennial, erect, 3–9 dm. high, the root fleshy, deep conic; lower and basal leaves 2–3-pinnate; leaflets linear or lanceolate, dentate, lobed or pinnatifid; upper leaves smaller, less divided; bracts parted into linear or filiform lobes; umbels 5–10 cm. broad; rays numerous, crowded, 1–5 cm. long; the outer ones longer than the inner; pedicels very slender, 2–4 mm. long in fruit; flowers usually white, the central one of each umbel often purple; fruit 3–4 mm. long, bristly on the winged ribs.

Occasional in waste places.

Family 76. CORNACEAE. DOGWOOD FAMILY.

Trees or shrubs or rarely herbs, with simple and entire opposite or rarely whorled leaves, and flowers in cymes or spikes, perfect or dioecious. Calyx-tube adnate to the ovary, its limb 4–5-dentate or 4–5-lobed or none. Petals generally 4 or 5, sometimes wanting, usually valvate spreading, inserted at the base of the epigynous

disk. Stamens as many as the petals or more numerous, inserted with them; filaments subulate or flat. Ovary inferior, 1-2-celled; styles 1 or 2; ovules pendulous. Fruit a drupe or berry, 1-2-seeded.

Flowers perfect; petals present.
Flowers diœcious; petals wanting.

1. SVIDA.
2. GARRYA.

1. SVIDA Opiz. DOGWOOD.

Shrubs or trees or rarely herbs, with simple mostly entire and usually opposite, rarely verticillate leaves, and small flowers in cymes or heads, the latter involucrate with large white bracts. Calyx-limb minutely 4-toothed. Petals 4, valvate. Stamens 4. Ovules 1 in each cell. Drupe ovoid or globose, the stone 2-celled and 2-seeded.

1. *S. californica* (C. A. Mey.) Abrams. Shrub, 2-5 m. high, with smooth purplish branches; leaves ovate to oblong-elliptic, acute or somewhat acuminate, shortly cuneate at base, 5-10 cm. long, paler beneath and more or less pubescent with loose silky hairs, especially on the veins; cyme spreading, round-topped, 3-5 cm. broad; fruit white, subglobose; stone 5 mm. broad, somewhat compressed, furrowed on the edges. (*Cornus pubescens* Nutt.)

Occasional in moist ground, especially in the mountains, but reported from Cienega by Davidson.

The western flowering dogwood, *Cynoxylon* (*Cornus*) *nuttallii* (Audb.) Shafer, with the flowers in heads subtended by showy white involucre bracts, occurs in the coniferous forests of the San Bernardino Mountains.

2. GARRYA Dougl. SILK-TASSEL TREE.

Evergreen shrubs with 4-angled branchlets, opposite entire coriaceous leaves, the short petioles connate at the base, and diœcious apetalous flowers in axillary aments, solitary or in 3's between the decussately connate bracts. Calyx of staminate flowers 4-parted, with linear valvate segments. Stamens 4, with distinct filaments. Disk and ovary none. Pistillate flowers with the calyx-limb shortly 2-lobed or obsolete. Disk and stamens none. Ovary 1-celled; ovules 2; styles 2, stigmatic on the inner side, persistent. Berry ovoid, 1-2-seeded.

1. *G. veatchii palmeri* (Wats.) Eastw. An erect, branching shrub, 18-25 dm. high; branchlets sparsely pubescent with close appressed silky hairs when young, becoming smooth with age;

petioles short, 2-6 mm. long; leaves coriaceous, oval or oblong-ovate, slightly undulate or entire, acute at apex and aristate, rounded or cuneate at base, glabrous or nearly so above, densely tomentose beneath with matted hairs, 2.5-5 cm. long; bracts prominent, acute or acuminate, the lower foliaceous; fruit cuneate at base, the lower short-pedicelled, densely silky, becoming glabrate; calyx-teeth prominent and close to the base of the styles. (*G. flavescens palmeri* Wats.)

Rather frequent in the upper portions of the chaparral belt of the San Antonio and Cuyamaca Mountains. January.

1a. *G. veatchii undulata* Eastw. Leaves elliptic or elliptic-ovate, obtuse or aristate at apex, cuneate at base, the margins undulate; fruit densely clustered, concealing the upper bracts; calyx-teeth hidden in dense wool and some distance below the base of the styles.

Occasional on Mount Wilson and Mount Lowe.

2. *G. pallida* Eastw. Leaves ovate to ovate-lanceolate, acute and with a recurved mucro, entire, sparsely silky-pubescent beneath, with straight upwardly appressed pubescence; racemes short; bracts about 3 mm. long; calyx-teeth close to the base of the styles and concealed in the young fruit by dense hairs.

Santa Ana Mountains, where it was collected by the author on the trail to Santiago Peak.

Family 77. PYROLACEAE. WINTERGREEN FAMILY.

Low mostly very green perennials, with branched rootstocks, simple petioled leaves, and nearly regular white or purple perfect flowers, racemose, solitary or corymbose. Calyx 4-5-lobed. Corolla very deeply 4-5-parted, or of 5 distinct petals. Stamens twice as many as the divisions of the corolla, the anthers introrse in the bud, inverted at anthesis, opening by pores or short slits; pollen grains in 4's. Ovary superior, 4-5-celled; style short or slender, often declined; stigma 5-lobed or 5-crenate; ovules very numerous, anatropous. Capsule loculicidally dehiscent. Seeds very numerous, minute, the loose cellular coat much larger than the almost undifferentiated embryo.

Flowers racemose.
Flowers corymbose.

1. PYROLA.
2. CHIMAPHILA.

1. **PYROLA** L. WINTERGREEN.

Low glabrous perennial herbs, acaulescent or nearly so, stoloniferous. Leaves basal and persistent, in one species wanting. Flowers nodding, in a simple raceme terminating bracted scapes. Calyx 5-parted, persistent. Petals 5, deciduous. Stamens 10, declined or straight and connivent; anthers reversed at flowering time, each sac opening by a basal (apparently apical) pore. Ovary 5-celled; style straight or declined; stigma 5-lobed. Capsule globose, 5-lobed, loculicidally 5-valved.

Leaves wanting.

1. *P. aphylla*.

Leaves present.

2. *P. pallida*.

1. **P. aphylla** Smith. Scapes leafless, 2–3 dm. high, arising from a long deep scaly-bracted rootstock; raceme loosely many-flowered; calyx-lobes ovate, acute, 4 mm. long, reddish; petals whitish, obovate, about 15 mm. long.

A Pacific Coast species, extending from the Cuyamaca Mountains to British Columbia. Not yet found in the San Gabriel Mountains.

2. **P. pallida** Greene. Scapes about 2 dm. high; leaves pale glaucous green, not mottled, obovate and obtuse to almost elliptic, subcoriaceous, with a narrow entire callous margin; petals greenish, narrowly obovate, 6–8 mm. long.

Immature specimens of what seems to be this species were collected by the author in Swartout Canyon, San Gabriel Mountains. These differ from the northern plants in the larger calyx-lobes and more rounded leaves.

2. **CHIMAPHILA** Pursh.

Perennial herbs with decumbent stems, ascending leafy branches, opposite or verticillate evergreen short-petioled serrate leaves, and spreading or nodding white or purplish flowers in terminal corymbs or rarely solitary. Pedicels mostly bracteolate. Calyx 5-cleft or 5-parted, persistent. Petals 5, concave, nearly orbicular, sessile, spreading or recurved. Stamens 10, the filaments usually dilated above and somewhat pubescent. Ovary globose, 5-lobed, 5-celled; styles very short, obconic; stigma large, orbicular, 5-crenate.

1. **C. menziesii** Spreng. More or less branched from the base, 1–2 dm. high; leaves ovate to oblong-lanceolate, 12–36 mm. long, sharply serrulate, the upper surface often mottled with white; peduncle 1–3-flowered; bracts ovate or roundish; filaments slender, with a round dilated portion above the middle, villous; flowers about 1 cm. in diameter.

Mount Wilson under pines. Frequent in the San Antonio, San Bernardino and Cuyamaca Mountains.

Family 78. MONOTROPACEAE.**INDIAN-PIPE FAMILY.**

Saprophytic or humus-plants, with mostly simple leafless bracted scapes, and solitary or clustered perfect regular flowers. Calyx free from the ovary, 2-6-parted, the sepals deciduous. Petals united or distinct, or rarely wanting. Stamens 6-12, hypogynous; filaments distinct or united at base. Ovary superior, 1-6-celled; style 1, simple; stigma capitate or slightly lobed. Ovule numerous. Capsule terete or 4-6-lobed, loculicidally 4-6-valved; seeds minute.

1. SARCODES Torr. SNOW-PLANT.

Saprophytic herb, with stout fleshy bracted stems. Flowers in a simple terminal raceme. Calyx of 5 oblong erect sepals. Corolla cylindraceous-campanulate, 5-lobed, persistent. Stamens 10, included. Ovary 5-lobed, 5-celled. Capsule fleshy.

1. *S. sanguinea* Torr. Stems stout, reddish, 15-35 cm. high, more or less glandular-pubescent, clothed with firm fleshy scales, the upper narrower, passing into the linear bracts, these ciliate-margined, exceeding the flowers; corolla cylindraceous-campanulate, 5-lobed, persistent; stamens 10, unappendaged; ovary 5-lobed, 5-celled.

Frequent in the coniferous forests of the San Antonio and San Bernardino Mountains above 7000 feet.

Family 79. ERICACEAE. HEATH FAMILY.

Shrubs, perennial herbs or trees, with simple exstipulate leaves, and mostly perfect sympetalous or rarely choripetalous flowers. Calyx free from the ovary, 4-5-parted or 4-5-cleft, mostly persistent. Corolla regular or rarely somewhat 2-lipped and irregular, usually 4-5-toothed, lobed or divided. Stamens hypogynous, usually as many or twice as many as the corolla-lobes; filaments mostly separate; anthers 2-celled, attached to the filament by the back or base, the sacks often prolonged above into tubes, dehiscent by terminal pores or

chinks, often awned. Disk crenate-lobed or often none. Ovary usually 2-5-celled; style elongated or short; stigma peltate or capitate; ovules usually numerous, anatropous. Fruit a capsule, berry or drupe. Seeds numerous or sometimes only 1 in each cavity; endosperm fleshy.

Fruit a 5-celled berry; ovules and seeds several in each cavity.

1. ARBUTUS.

Fruit drupaceous; ovules and seeds 1 in each cavity; stones separable or coalescent.

Ovary and fruit papillose or warty, becoming fleshy.

2. COMAROSTAPHYLIS.

Ovary and fruit smooth or pubescent, not fleshy but often mealy.

3. UVA-URSI.

1. ARBUTUS L.

Trees or shrubs, with evergreen and coriaceous alternate petiolate leaves, and white or flesh-colored small flowers in a terminal cluster of racemes or panicles. Bracts and bractlets scaly. Calyx small, 5-parted. Corolla urceolate with 4-5 small recurved teeth. Ovary on an hypogynous disk, 4-5-celled; ovules crowded on a fleshy placenta projecting from the inner angles of each cell. Style rather long; stigma obtuse. Fruit a many-seeded berry.

1. *A. menziesii* Pursh. (MADROÑO.) Commonly 5-10 m. high; bark exfoliating, deep red; leaves glabrous, elliptic or ovate, green above, glaucous beneath, 5-10 cm. long, entire or those of young shoots denticulate; petioles about 1 cm. long; flowers in an ample terminal panicle or dense racemes; berry fleshy, red, subglobose, 8-10 mm. in diameter, surface granular.

Mount Wilson and Sturtevant trails at about 3000 feet altitude, and in Los Tunas Canyon, Santa Monica Mountains.

2. COMAROSTAPHYLIS Zucc.

Shrubs with alternate persistent coriaceous leaves, and racemose panicles of small urn-shaped flowers. Calyx persistent, 4-5-lobed. Corolla urn-shaped, with 4-5 mostly reflexed lobes. Stamens 10 or rarely 8; filaments short, dilated near the base, pubescent, without appendages; anthers with a slender sac on each sac. Ovary 5-celled. Fruit globular, fleshy, papillose or warty, the 5 or fewer nutlets united into a round stone.

1. *Comarostaphylis diversifolia* (Parry) Greene. Shrub with brown shredded bark, tomentose twigs and inflorescence; leaves evergreen, elliptic-ovate, 3–6 cm. long, finely serrate, glabrous above, tomentose beneath; racemes 7–10 cm. long; pedicels 1–2 cm. long, tomentose; fruit fleshy, deep red, rugose-granular, stone solid.

On the islands off the coast of southern California, and from the vicinity of San Diego southward into northern Lower California; also within our range in Topango Canyon, Santa Monica Mountains, *Hasse*.

3. UVA-URSI Mill.

Shrubs or small trees with evergreen coriaceous alternate leaves, and small white or rose-colored flowers, in racemes, spikes or panicles. Bracts and bractlets present, scale-like. Ovules solitary in the cells, which become bony nutlets or combine into a few-several-celled stone. Fruit a drupe with a hard surface and a mealy or almost bony pulp between it and the nutlets. (*Arctostaphylos* Adans.)

Pedicels and ovaries glabrous.

Stone solid, broadly ellipsoid, merely angled or ribbed; inflorescence and young leaves canescent with a short pubescence.

1. *U. parryana*.

Stone lobed, depressed-globose, irregularly separable into nutlets.

Branchlets, inflorescence and young leaves canescent with a short pubescence; leaves dull green.

2. *U. pungens*.

Branchlets and inflorescence with a golden undument or glandular pubescent; leaves yellow-green.

3. *U. patula*.

Pedicels more or less pubescent or villous; ovaries pubescent or viscid.

Bracts firm, herbaceous or foliaceous; sepals ciliate on the margins, otherwise glabrous or puberulent.

Fruit ovoid, viscid; stone solid; branchlets glabrous.

4. *U. glauca*.

Fruit depressed-globose, pubescent not viscid; lobed and separable; branchlets pubescent or villous.

5. *U. tomentosa*.

Bracts thin and scarious; sepals and herbage glandular-villous; stone solid, ovoid.

6. *U. drupacea*.

1. *U. parryana* (Lemmon) Abrams. Arborescent shrub, 1–3 m. high, branchlets, petioles and inflorescence canescent with a minute puberulence; leaves ovate to ovate-elliptic, 20–35 mm. long; panicle 3–4 cm. long; bracts ovate-triangular, about 3 mm. long; pedicels glabrous; fruit ovoid-globular; stone solid, broadly ellipsoid, merely angled or ribbed.

Tehachapi Mountains south to Mt. San Antonio,

2. **U. pungens** (H. B. K.) Abrams. Shrubby or arborescent, 2–8 m. high; bark mahogany-red, exfoliating, twigs and petioles minutely tomentose-pubescent; leaves dull green, commonly vertical by a twist in the short petiole, rigid, ovate-oblong, glabrous on both surfaces, 2.5–5 cm. long; petioles 6–10 cm. long; bracts less than 4 mm. long; pedicels smooth, corolla pinkish; ovary smooth; fruit irregularly depressed-globose, 8–12 mm. broad, reddish brown; nutlets irregularly separable, rough-carinate.

Occasional in the San Gabriel Mountains. More common in the San Bernardino Range. In both confined mostly to the upper portions of the chaparral belt.

3. **U. patula** (Greene) Abrams. Diffusely branched shrub, 1–1.5 m. high; young twigs rusty puberulent or nearly smooth; leaves smooth, bright green, ovate to broadly cordate, 2–5 cm. long, entire, obtuse; bracts lanceolate; pedicels smooth; fruit smooth, depressed-globose, about 6 mm. in diameter; nutlets united into a deeply lobed stone.

Occasional on dry ridges in the open pine woods of the San Antonio and San Bernardino Mountains, 5000–8000 feet altitude.

4. **U. glauca** (Lindl.) Abrams. Shrubby, erect, 3–6 m. high, smooth throughout; leaves glaucous, ovate, entire or denticulate; bracts foliaceous, conspicuous; pedicels stout, glandular-pubescent; ovary viscid-glandular, 6–8-celled; fruit dark red, very viscid; stone with longitudinal ridges, sharply apiculate.

Occasional in the San Gabriel Mountains. More common in the San Antonio and San Bernardino Ranges.

5. **U. tomentosa** (Pursh) Abrams. Shrubby, erect, 1.5–3 m. high, twigs, foliage and pedicels minutely tomentose when young, the twigs often also hispid with scattered hairs; leaves glaucescent, paler and tomentose beneath, ovate to elliptic, entire or sometimes denticulate; bracts conspicuous, foliaceous, usually exceeding the short pubescent or somewhat hispid pedicels; ovary densely hirsute, 7–10-celled; fruit hirsute, minutely roughened; nutlets all separate or some united in pairs.

Common in all our mountains in the upper chaparral belt. The common form in the San Gabriel Mountains is usually more or less glandular, but all gradations occur, so that it does not seem possible to separate them.

6. **U. drupacea** (Parry) Abrams. An erect, branching shrub, 1.5–2 m. high; twigs and petioles hispid and glandular-pubescent; leaves ovate to obovate, mucronate, rough, with ciliate margins, on petioles 4–8 mm. long; inflorescence in dense divaricate panicles; bracts linear-lanceolate; pedicels slender, 10–15 mm. long, glandular-pubescent; calyx-lobes lanceolate, densely glandular-villous, ovary glandular-hispid; nutlets consolidated into a rough carinate stone.

Occasional in the pine belt of the San Bernardino, San Jacinto and Cuyamaca Mountains.

XYLOCOCCUS BICOLOR Nutt. Shrub, 1–2 m. high; leaves ovate or oblong, 4–6 cm. long, margins entire, strongly revolute, glabrous above, white-tomentose beneath, short-petiolate; inflorescence in

few-flowered compact racemes; bracts stout, pedicels lanceolate; calyx-lobes and ovary tomentose; fruit globose, 6–8 mm. in diameter, dark brown, puberulent or smooth; nutlets united into a round solid, nearly smooth stone.

Frequent in the foothills of western San Diego County. Reported from Catalina Island.

Family 80. PRIMULACEAE. PRIMROSE FAMILY.

Herbs with alternate opposite or basal leaves and perfect regular flowers in terminal or axillary racemes, spikes, umbels or corymbs, or solitary in the axils. Calyx free from the ovary, usually 5-parted; persistent or rarely deciduous. Corolla sympetalous, usually 5-cleft, the lobes (in ours) spreading or reflexed. Stamens as many as the corolla-lobes and opposite them, inserted on the tube or at the base of the ovary; anthers introrse, attached by their backs to the filaments, 2-celled, longitudinally dehiscent. Ovary superior, 1-celled; placenta central, free; style 1; stigma simple, capitate. Capsule 2–6-valved; valves erect, entire or 2-cleft. Seeds few or many; endosperm present.

Sterile filaments alternate with the corolla-lobes. 1. SAMOLUS.

Sterile filaments wanting.

Flowers axillary on leafy stems.

2. ANAGALLIS.

Flowers in umbels at the ends of scapes.

3. DODECATHEON.

1. SAMOLUS L. BROOKWEED.

Low glabrous herbs with alternate entire leaves and small white flowers in loose racemes. Calyx 5-cleft, its base coherent with the lower part of the ovary. Corolla campanulate, 5-cleft, with a slender tooth borne at each sinus. Stamens 5, short and included, inserted on the tube of the corolla. Capsule globular, 5-valved at the summit, many-seeded.

1. *S. floribundus* H. B. K. Erect or ascending, branched at least at the base, 15–45 cm. high; leaves membranous, 25–75 mm. long, obovate, obtuse at the apex, narrowed at the base into petioles, the basal often rosulate; flowers small, less than 2 mm. broad, usually numerous, in loose elongated panicked racemes; pedicels filiform, spreading, bracteolate near the middle; calyx-lobes acute,

shorter than the corolla; capsule 2-3 mm. in diameter, the 5 apical valves spreading at maturity. (*S. valerandi americanus* Gray.)

Occasional along watercourses. Lytle Creek; San Bernardino Valley.

2. *ANAGALLIS* L. PIMPERNEL.

Annual or perennial diffuse or erect branching mostly glabrous herbs, with opposite or verticillate sessile or short-petioled leaves, entire or nearly so, and small axillary peduncled flowers. Calyx 5-parted, persistent. Corolla deeply 5-parted, rotate. Stamens 5, inserted at the base of the corolla; filaments puberulent, distinct or united into a narrow ring at the base; anthers oblong, obtuse. Ovary globose; ovules numerous; stigma obtuse. Capsule globose, circumscissile. Seeds minute, flat on the back.

1. *A. arvensis* L. Annual, diffuse, usually much branched; stems 1-3 dm. long, 4-sided; leaves ovate or oval, numerous, opposite, sessile or somewhat clasping, obtuse or acutish, 6-20 mm. long, black-dotted beneath; peduncles filiform, 1-4 cm. long, recurved in fruit; calyx-lobes keeled, rather rigid, slightly shorter than the crenate glandular ciliate corolla-segments; flowers scarlet or salmon color, usually with a dark center, 4-6 mm. broad; capsule glabrous.

Common in waste places and gardens. Flowering nearly all the year.

3. *DODECATHEON* L. SHOOTING-STAR.

Glabrous scapose perennial herbs, with entire or repand basal leaves, and rather large flowers in involucrate umbels terminating scapes. Calyx deeply 5-lobed, the lobes reflexed, slightly unequal, the tube very short, thickened at the throat. Stamens 5, inserted on the throat of the corolla; filaments short, flat, monadelphous, connivent into a cone, exserted; anthers linear or lanceolate, connivent, attached by their bases to the filaments. Ovary ovoid or subglobose, superior; style filiform, exserted; stigma 5-6-valved at the apex or splitting to the base. Seeds numerous, minute, the testa punctate.

1. *D. clevelandi* Greene. Pale green and glandular, 3-6 dm. high; roots formed at the beginning of the dry season and remaining dormant, no tubers formed; leaves scarcely fleshy, ascending or erect, spatulate-obovate, the margins erose; corolla bright purple with a yellow base; filaments purple, becoming yellow at the base of the anthers; anthers purple except the midvein, about twice the length of the staminal tube, the apex blunt, retuse; capsule oblong, circumscissile at the top.

Frequent on dry mesas and grassy hillsides. March-April.

Family 81. PLUMBAGINACEAE.**PLUMBAGO FAMILY.**

Perennial, mostly acaulescent erect herbs, with basal tufted leaves and small perfect regular clustered flowers. Calyx tubular or funnelform, 5-toothed, plaited at the sinuses, the tube 5–15-ribbed. Corolla of 5 hypogynous clawed segments, connate at the base or united into a tube. Stamens 5, opposite the corolla-segments, hypogynous; filaments separate or united at the base; anthers 2-celled, attached by the backs to the filaments, longitudinally dehiscent. Ovary superior, 1-celled; ovules solitary, anatropous, pendulous; styles 5, separate or united. Fruit a utricle or achene, enclosed by the calyx, rarely a dehiscent capsule. Seed solitary; endosperm mealy or none.

1. LIMONIUM Adans. MARSH ROSEMARY.

Herbs, mostly with flat basal leaves, and numerous very small flowers cymose-paniculate on the branches of bracted scapes, in 1–3-flowered bracteolate clusters, forming 1-sided spikes. Calyx campanulate or tubular, the limb scarious, 5-toothed, the tube usually 10-ribbed. Petals 5, clawed. Styles 5, separate, stigmatic along the inner side. Fruit a utricle.

1. **L. californicum** (Boiss.) Small. Leaves 15–25 cm. long, obovate-oblong, entire, fleshy-coriaceous; scape 3–6 dm. high; spikes corymbose-panicled; calyx-tube more or less hairy on the angles.

Occasional in salt marshes along the coast.

Family 82. OLEACEAE. OLIVE FAMILY.

Trees or shrubs with opposite or rarely alternate simple or pinnate exstipulate entire or dentate leaves, and regular perfect, polygamous or dioecious, 2–4-parted flowers in terminal or axillary panicles, cymes or fascicles. Calyx free from the ovary, usually small, sometimes none. Stamens 2–4, inserted on the corolla; filaments usually

short, separate; anthers mostly large, 2-celled, longitudinally dehiscent. Ovary superior, 2-celled; ovules few in each cell; style usually short or none. Fruit a capsule, samara, berry or drupe. Seeds erect or pendulous; endosperm present or wanting; embryo straight.

1. **FRAXINUS** L. ASH.

Trees or tall shrubs with opposite and usually odd-pinnate leaves, and small dioecious or polygamous, rarely perfect, greenish fasciculate flowers, appearing before or with the leaves. Calyx small, 4-cleft, irregularly toothed, entire or none. Petals none or 2-4, separate, or united in pairs at the base, induplicate valvate. Stamens 2, rarely 3-4, inserted on the base of the petals or hypogynous; filaments short-elongated; anthers ovate, oblong or linear. Ovules 2 in each cell, pendulous; stigma 2-cleft. Fruit a flat samara, winged at the apex only or all around, usually 1-seeded. Seed oblong.

1. **F. oregana** Nutt. A small or middle-sized tree; leaves tomentose or glabrate in age; leaflets 5-9, oval to oblong-lanceolate, entire, sessile, 5-10 cm. long; flowers all with minute calyx and no petals; fruit marginless at base, margined upwards into oblanceolate or spatulate retuse wing, the whole 2.5-4 cm. long.

San Gabriel and Lytle Creek Canyons.

2. **F. dipetala** H. & A. Shrub 2.5-4 m. high; leaves 5-15 cm. long; leaflets 3-9, green above, yellowish green beneath when young, oblong, coarsely serrate above the middle, mostly petioled, 2-4 cm. long; flowers mostly perfect; calyx less than 2 mm. long; petals 2, oval, narrowed at base to a short claw, 6 mm. long; white; style slightly lobed at apex; fruit linear-oblong to spatulate-oblong, the terminal wing frequently emarginate at apex.

Occasional in canyons.

Family 83. **GENTIANACEAE.** GENTIAN FAMILY.

Bitter, mostly quite glabrous herbs, with opposite rarely verticillate exstipulate entire leaves, and regular perfect flowers in terminal or axillary clusters or solitary at the ends of the stems or branches. Calyx persistent, 4-12-lobed, -toothed or -divided, the lobes imbricated or not meeting in the bud. Corolla funnelform, campanulate or rotate, often marcescent, 4-12-lobed or -parted.

Stamens as many as the lobes of the corolla and alternate with them, inserted on the tube or throat; anthers 2-celled, longitudinally dehiscent; filaments filiform or dilated at the base. Ovary superior, 1-celled or partly 2-celled; ovules numerous; style simple or none; stigma entire or 2-lobed or 2-cleft. Capsule mostly dehiscent by 2 valves. Seeds globose, angular or compressed; endosperm copious; embryo small, straight.

1. **ERYTHRAEA** Neck. CANCHALAGUA.

Herbs, mostly annual or biennial, with sessile or amplexicaul leaves, and pink or yellow flowers in cymes or spikes. Calyx tubular, 4-5-lobed or 4-5-divided, the lobes narrow, keeled. Corolla salver-shaped, 4-5-lobed, the lobes spreading, contorted, convolute in the bud. Stamens 4-5, inserted on the base of the corolla-tube; filaments short, filiform; anthers linear or oblong, becoming spirally twisted. Ovary 1-celled, the placenta sometimes intruded; style filiform; stigma 2-lobed. Capsule oblong-ovoid or fusiform, 2-valved. Seed-coat reticulated.

1. **E. venusta** Gray. Simple and cymosely several-flowered at the summit or corymbosely branched, 8-20 cm. high; leaves ovate to oblong-lanceolate, 1-2 cm. long, obtusish; calyx-lobes very narrow to the base; corolla bright pink with a yellow center, the limb 2 cm. broad, lobes oval or obovate; anthers oblong-linear; seed spherical. Frequent in interior valleys. May-June.

Family 84. APOCYNACEAE. DOGBANE FAMILY.

Perennial herbs or rarely shrubs, mostly with acrid milky juice, simple opposite or alternate exstipulate leaves, and perfect regular cymose, solitary or paniculate flowers. Calyx 5-parted, persistent, the lobes imbricated in the bud. Corolla 5-parted, the lobes convolute in the bud. Stamens as many as the lobes of the corolla and alternate with them, inserted in the tube or throat; anthers linear-oblong, sagittate, 2-celled. Ovary superior or its base adherent to the calyx, of 2 distinct

carpels, or 1-celled with 2 parietal placentæ, or 2-celled; ovules few or numerous; style simple or 2-divided; stigma simple. Fruit of 2 follicles or drupes. Seeds often appendaged by a coma; endosperm present; embryo straight.

1. APOCYNUM L. DOGBANE.

Perennial herbs with opposite leaves and small white or pink flowers in terminal and sometimes axillary corymbed cymes. Calyx-lobes acute. Corolla campanulate, the tube beading within 5 small triangular appendages alternate with the stamens. Stamens inserted on the base of the corolla; anthers sagittate, connivent around the stigma and slightly adherent to it. Disk 5-lobed. Ovary of 2 distinct carpels; ovules numerous in each carpel; stigma ovoid, obtuse, obscurely 2-lobed. Follicles slender, elongated, terete. Seeds small, tipped with a large coma.

1. *A. cannabinum* L. (INDIAN HEMP.) Root deep, vertical; stem much branched, the branches erect or ascending, glabrous or nearly so, more or less glaucous; leaves oblong or lanceolate-oblong to ovate-oblong, acute or obtuse and mucronate at apex, narrowed or rounded at base, glabrous above, sometimes pubescent beneath, 5-15 cm. long; petioles 2-12 mm. long or sometimes none; cymes dense; pedicels short, bracteolate at the base; flowers 5-7 mm. broad; calyx-lobes about equaling the tube of the greenish white corolla; corolla-lobes nearly erect; follicles about 10 cm. long, narrowed at the apex.

Occasional in moist places along streams.

Family 85. ASCLEPIADACEAE. MILKWEED FAMILY.

Perennial herbs, vines or shrubs, mostly with milky juice, opposite verticillate or alternate exstipulate leaves, and mostly umbellate perfect regular flowers. Calyx-tube very short, its segments imbricated or separate in the bud. Corolla 5-lobed or 5-cleft, the segments commonly reflexed. A 5-lobed or 5-parted crown (corona) between the corolla and the stamens and adherent to one or the other. Stamens 5, inserted on the corolla; filaments short, stout, mostly monadelphous or distinct;

anthers attached by their bases to the filaments, introrsely 2-celled; anther-sacs tipped with an inflexed or erect scarious membrane or unappendaged; pollen coherent into waxy or granular masses. Ovary of 2 carpels; styles 2, short, connected at the summit by the peltate discoid stigma; ovules numerous, pendulous. Fruit of 2 several-many-seeded follicles. Seeds compressed, usually appendaged by a long coma.

Plants twining.

Plants erect or decumbent, not twining.

1. PHILIBERTELLA.

2. ASCLEPIAS.

1. PHILIBERTELLA Vail.

Twining herbs or somewhat shrubby, with opposite leaves and umbellate flowers. Calyx small, 5-parted, the lobes acute. Corolla campanulate or rotate, deeply 5-parted, the lobes acute or obtuse, with a shallow entire or undulate ring forming an outer crown in its throat. The inner staminal crown consisting of 5 turgid fleshy or hard scales or flattish appendages, attached in a circle at the base of the sessile or slightly stalked column, forming a hollow entire or undulate spreading surface near the level of the conic stigmas. Follicles naked, slender, attenuate at both ends or obtuse at base.

1. *P. hartwegii heterophylla* (Engelm.) Vail. Stems slender, twining, glabrous, puberulent or somewhat pubescent above; leaves 2.5–5 cm. long, 2–4 mm. wide, variable, some tapering into the petiole, others with rounded and more with dilated or auriculate-cordate or truncate base; corolla scarcely puberulent, 1 cm. broad, its lobes acute; column sessile.

Occasional on dry hillsides in interior valleys, growing over low shrubs or herbs.

2. ASCLEPIAS L. MILKWEED.

Perennial erect or decumbent herbs, with opposite verticillate or rarely alternate leaves, and flowers in terminal or axillary umbels. Calyx 5-parted or 5-divided, usually small, the lobes acute, often glandular within. Corolla deeply 5-parted, the lobes mostly valvate, reflexed in anthesis. Corona-column generally present. Corona of 5 concave, erect or spreading hoods, each bearing within a slender or subulate incurved horn. Filaments connate into a tube; anthers tipped with an

inflexed membrane; winged, the wings broadened below the middle; pollen-masses solitary in each sac, pendulous on their caudicles. Stigma nearly flat, 5-angled or 5-lobed. Follicles usually thick, acuminate. Seeds usually comose.

1. *A. eriocarpa* Benth. Erect, 5–8 dm. high; densely floccose-woolly, the loose wool hardly deciduous except from the angled stem below; leaves not rarely ternate and the uppermost alternate, elongated-oblong or the upper lanceolate, obtuse or subcordate at base, short-petioled, 10–20 cm. long; umbels few or several, on stout peduncles; flowers dull white; corolla at first woolly outside; the lobes longer than the pedicels; column short but distinct; hoods shorter than the anthers, rather spreading, ventricose, semiorbicular in outline and open round to near the middle of the back, the summits produced inwardly into an acute angle or tooth barely enclosing the filiform acute horn; ovaries glabrous, the summit of the styles villous; follicles more or less woolly.

Frequent on dry mesas and in the foothills, also occasionally in the pine belt of the San Gabriel Mountains.

2. *A. mexicana* Cav. Stems 6–12 dm. high, glabrous or sparsely puberulent; leaves in whorls of 3–6 or the lower and uppermost opposite, linear to linear-lanceolate, 6–15 cm. long, 4–12 mm. broad, short-petioled; umbels many, corymbose, densely many-flowered, on peduncles longer than the pedicels; flowers greenish-white; corolla-lobes 4 mm. long; hoods broadly ovate, entire, shorter than the anthers, exceeded by the stout subulate incurved horn.

Frequent on the mesas and in the foothills.

Family 86. CONVOLVULACEAE. MORNING-GLORY FAMILY.

Herbs (some tropical species shrubs or trees), the stems twining or ascending, trailing or erect, with alternate exstipulate leaves and regular perfect axillary, cymose or solitary flowers. Calyx 5-parted or 5-divided, usually persistent, the segments imbricated. Corolla often funnelform or campanulate, the limb 5-angled, 5-lobed or entire. Stamens 5, inserted low down on the tube of the corolla and alternate with its lobes; anthers 2-celled, longitudinally dehiscent. Ovary superior, sessile, 2–3-celled, with 2 ovules in each cell, entire or 2–4-divided; styles 1–3. Fruit a 2–4-valved capsule or of 2–4 distinct carpels. Seeds erect, villous, pubescent or glabrous; embryo plaited or crumpled.

Style 1.

Stigmas capitate.

Stigmas filiform or oblong.

Styles 2.

1. IPOMŒA.

2. CONVULVULUS.

3. CRESSA.

1. IPOMŒA L. MORNING-GLORY.

Twining, trailing, ascending or rarely erect herbs with large showy axillary solitary or cymose flowers. Sepals equal or unequal. Corolla funnellform or campanulate, the limb entire, 5-angled or 5-lobed. Stamens equal or unequal, included; filaments filiform or dilated at the base; anthers globose or ovoid; ovary 2-4-celled, 4-6-ovuled; style filiform, included; stigmas 1-2, capitate or globose. Capsule septifragally 2-4-valved, 2-4-seeded.

1. *I. purpurea* (L.) Roth. Annual, pubescent; stem retrosely hairy, twining or trailing; leaves broadly ovate, deeply cordate, acute or acuminate, 5-10 cm. broad; peduncles slender, 1-5-flowered; sepals lanceolate or oblong, acute, pubescent or hirsute toward the base; corolla 5-7 cm. long, blue or purple varying to white; ovary 3-celled, rarely 2-celled; capsule depressed-globose, shorter than the sepals.

An escape from gardens. Introduced from tropical America.

2. CONVULVULUS L.

Herbs, mostly perennials with slender rootstocks and trailing twining or erect stems. Flowers axillary, solitary or clustered, large and showy. Sepals nearly equal or the outer larger, the calyx bractless or with a pair of bracts at or near its base. Corolla and stamens as in *Ipomoea*. Ovary 1-2-celled; style filiform; stigmas 2, filiform, oblong or ovoid. Capsule globose or nearly so, 1-4-celled, 2-4-valved.

Bracts remote from the calyx, small, subulate.

1. *C. arvensis*.

Bracts usually embracing the calyx, broad.

Leaves reniform, thick and succulent.

2. *C. soldanella*.

Leaves cordate to sagittate, not succulent.

3. *C. occidentalis*.

1. *C. arvensis* L. Perennial, prostrate; the stems 3-10 dm. long; leaves oblong, sagittate or hastate, 2.5-5 cm. long, the basal lobes short; pedicels 1-3-flowered, with a pair of subulate bracts near the base; corolla white with a tinge of purple on the outside, neither lobed nor angled; stigma filiform.

Occasional in cultivated fields and waste places. May-November.

2. *C. soldanella* L. Low, glabrous, slightly succulent; stems 15-30 cm. long, prostrate; leaves reniform, deep green and shining,

2.5–5 cm. long; corolla 4 cm. broad, pinkish; capsule 1-celled; stigma ovate-oblong, thickish.

On the sandy beaches along the seashore. May–June.

3. *C. occidentalis* Gray. Glabrous or minutely pubescent; stems freely twining over shrubs; leaves slender-petioled, from angular-cordate with a deep and narrow sinus to sagittate or the upper hastate; the basal lobes often 1–2-toothed; peduncles elongated, surpassing the leaf, 1–3-flowered; bracts at base of the calyx ovate or obscurely cordate, membranaceous, equaling it or somewhat longer, mostly obtuse; corolla campanulate-funnelform, white or pinkish, 3–5 cm. long; stigma linear.

Common in the chaparral belt in all our foothills and mountains.

3a. *C. occidentalis tenuissimus* Gray. Much resembling the typical form; leaves narrowly hastate or sagittate; the middle and basal lobes mostly narrowly lanceolate; bracts ovate-oblong or ovate-lanceolate, acute or acuminate.

Frequent in the San Gabriel and Santa Ana Mountains, south to San Diego.

3. CRESSA L.

Low canescent perennial herbs with erect or diffuse stems. Flowers solitary in the axils of the upper leaves. Sepals nearly equal. Corolla with an oblong-campanulate tube about equaling the calyx, the limb 5-parted. Stamens exserted from the throat. Styles 2; ovary 2-celled, 4-ovuled. Capsule often only 1-seeded.

1. *C. truxillensis* H. B. K. Perennial herb, much branched from the base, erect or ascending, 1–2 dm. high, silky-villous, leafy; leaves ovate-lanceolate, nearly sessile, 4–7 mm. long; flowers sessile or nearly so in the upper axils; corolla deeply 5-cleft, campanulate, 4–5 mm. long, white, silky-pubescent without.

Frequent in saline places throughout our range. June–October.

Family 87. CUSCUTACEAE. DODDER FAMILY.

White or yellow slender twining parasites, the leaves reduced to minute alternate scales. Calyx 5-lobed, rarely 4-lobed or 4–5-parted, the lobes imbricated in the bud. Corolla usually campanulate, 5-lobed, rarely 4-lobed, the tube bearing as many fimbriate or crenulate scales as there are lobes and alternate with them, or these sometimes obsolete. Stamens as many as corolla-lobes and alternate with them, inserted in the throat or sinuses above the scales; anthers short, 2-celled, longitudinally

dehiscent. Ovary 2-celled; ovules 2 in each cavity; styles 2, separate or rarely united below; stigmas capitate or linear. Capsule globose or ovoid, circumscissile, irregularly bursting or indehiscent, 1-4-seeded. Seeds globose or angular; embryo linear, curved or spiral; cotyledons none.

1. CUSCUTA L. DODDER.

Characters of the family. Stems filiform, parasitic on herbs and shrubs by minute suckers.

Ovary and capsule depressed-globose.

Calyx-lobes obtuse; scales conspicuous. 1. *C. arvensis*.

Calyx-lobes acute; scales none or rudimentary. 2. *C. californica*.

Ovary and capsule pointed.

Anthers about as long as the filaments. 3. *C. salina*.

Anthers subsessile. 4. *C. subinclusa*.

1. *C. arvensis* Beyrich. Stems filiform, pale yellow; flowers nearly sessile in small clusters; calyx-lobes broad, obtuse; corolla campanulate, its lobes as long as the tube, acute or acuminate, reflexed; scales large, ovate, equaling or exceeding the tube, densely fringed all around; capsule depressed-globose.

On various herbs about Los Angeles, *Davidson*.

2. *C. californica* Choisy. Stems capillary, low; flowers 2-4 mm. long, pedicelled in loose cymes; calyx-lobes acute; corolla-lobes lanceolate-subulate, as long as or longer than the campanulate tube; filaments nearly equaling the linear oblong anthers; scales none or rudimentary; style slender.

Occasional along the coast and in the interior, growing on various low shrubs.

3. *C. salina* Engelm. Stems slender; flowers 3-5 mm. long, pedicelled in loose cymes; calyx-lobes ovate-lanceolate, acute, as long as the denticulate corolla-lobes; corolla-tube shallow-campanulate; filaments about as long as the oval anthers; fringed scales shorter than the corolla-tube; capsule conic, usually 1-seeded.

In salt marshes along the coast, growing over *Salicornia*, etc.

4. *C. subinclusa* D. & H. Stems rather coarse, ascending small shrubs to the height of a meter or more; flowers 5-7 mm. long, sessile or short-pedicelled, at length in clusters 1-2.5 cm. thick; calyx-lobes ovate-lanceolate, acutish, much shorter than the cylindric or urn-shaped corolla-tube; corolla-lobes much shorter than the tube, minutely crenulate or papillose; anthers oval, subsessile; scales narrow, fringed, reaching to the middle of the tube; capsule conic, capped by the marcescent corolla.

Common in the foothills, usually on shrubs or coarse herbs.

Family 88. POLEMONIACEAE. PHLOX FAMILY.

Herbs or rarely low shrubs, with alternate or opposite, entire, lobed or dissected leaves, and perfect regular or nearly so flowers, corymbose-capitate, cymose or paniculate. Calyx tubular or campanulate, 5-cleft, the segments slightly imbricated. Corolla 5-parted, the lobes contorted. Stamens 5, inserted on the tip of the corolla and alternate with its lobes; filaments slender; anthers versatile, 2-celled, longitudinally dehiscent. Ovary superior, mostly 3-celled; ovules few-many in each cell; style simple, filiform; stigmas 3, linear. Capsule mostly loculicidally 3-valved. Seeds various.

Leaves alternate; annual herbs, or 1 species perennial and lignescent at base.

Calyx scarious between the angles, ruptured by the distended capsule.

Calyx scarious or coriaceous at base.

Leaves alternate, palmately lobed; shrubby.

Leaves opposite and—

Entire, the floral alternate.

Palmately lobed, upper verticillate.

3. *GILIA*.

2. *NAVARRETIA*.

4. *LEPTODACTYLON*.

1. *MICROSTERIS*.

5. *LINANTHUS*.

1. MICROSTERIS Greene.

Small much branched annuals with entire leaves, all except floral ones opposite, and minute flowers scattered singly or in pairs in the axils of the alternate leaves. Calyx tubular, 5-cleft, the lobes acute, scarious-margined. Corolla salver-shaped, the tube narrow. Stamens straight, short, unequally inserted on the corolla-tube. Capsule 3-celled, at length distending and rupturing the calyx-tube. Seeds few, large, the coat when moistened developing a thick glutinous mass.

1. *M. californica* Greene. Slender, 1-2 dm. high, loosely and somewhat dichotomously branched from the middle; leaves from obovate-subulate in the lowest to oblong and oblong-lanceolate, 1-2 cm. long, all more or less pubescent with scattered hairs, a few fine gland-tipped hairs on the flowering branches and calyx; calyx-teeth slightly shorter than the tube; corolla red, the lobes emarginate, little surpassing the calyx; capsule ovoid. (*Collomia gracilis* of recent authors, not of Douglas.)

Occasional in shady places in the foothills.

COLLOMIA GRANDIFLORA Dougl. A strict erect annual, with entire

oblong-lanceolate leaves, and large salmon-colored flowers in terminal and axillary heads.

Common in open pine woods in the San Bernardino, San Jacinto and Cuyamaca Mountains.

2. NAVARRETIA R. & P.

Glabrous and scentless or viscid-pubescent and heavy-scented annual herbs, with leaves all alternate, setaceously or spinosely pinnatifid, or the lowest subentire. Flowers in crowded bracted clusters at the ends of the branches. Calyx-tube scarious between the green angular or costate segments, unequal, erect or spreading, pungent-tipped or pungent-cleft, the 2 outer sometimes spinulose-toothed or -cleft. Corolla-tube funnelform or salver-shaped. Stamens and style exerted or included, straight or declined. Capsule 1-3-celled, 1-many-seeded, partially dehiscent or indehiscent. Seeds commonly mucilaginous and sending out threads containing each a spiral coil.

Herbage glabrous or nearly so; flowers nearly white.

1. *N. prostrata*.

Herbage viscid-pubescent; flowers purple.

Leaves narrowly linear, laciniate-pinnatifid.

2. *N. viscidula*.

Leaves lanceolate, beset with spinose-subulate teeth.

3. *N. atractyloides*.

1. **N. prostrata** (Gray) Greene. Glabrous or nearly so; flower clusters sessile near the ground, the few branches radiating from beneath and prostrate; leaves pinnatifid, the rachis broad and strap-shaped, the segments short and spreading; calyx-tube minutely white-hirsute, thin-hyaline between the stout costæ, constricted over the capsule, the segments spreading, 2 subulate and entire, 3 spinulose trifid; pericarp a transparent indehiscent utricle close-fitted to the amalgamated mass of glutinous seeds, breaking transversely or irregularly when soaked; seeds 4 in each cell. (*Gilia prostrata* Gray.)

In low adobe places on the mesas of the coast valley. Inglewood.

2. **N. viscidula** Benth. Viscid-pubescent, at length much branched, erect, 5-8 cm. high, rather stout; leaves narrowly linear but firm, laciniate-pinnatifid or parted into setaceous-subulate ascending lobes; the bracts ovate-dilated; flowers densely glomerate; corolla violet or purple, 8-10 mm. long; capsule of firm texture, dehiscent, normally 3-6-seeded. (*Gilia viscidula* Gray.)

Dry places of the interior plains and foothills. May-June.

3. **N. atractyloides** (Benth.) H. & A. Pubescent and very viscid, rigid-branched, spreading or procumbent, 5-15 cm. long; leaves ovate-lanceolate, rigidly coriaceous and in age reticulate, the

margins beset with divaricate spinose-subulate teeth; flowers less glomerate; corolla narrowly funnelform, 12–18 mm. long, deep purple; capsule dehiscent, 6–10-seeded. (*Gilia atractyloides* Steud.)

Frequent in dry washes. May–June.

3. *GILIA* R. & P.

Annual herbs, rarely perennial or shrubby, with alternate entire or pinnately toothed, lobed or divided leaves, and small or showy flowers more or less clustered at the ends of the branches. Calyx campanulate or tubular, 5-toothed or 5-lobed, scarious between the ribs or angles. Corolla funnelform. Stamens inserted equally on the throat. Capsule at length distending and rupturing the calyx. Seeds several in each cell, becoming mucilaginous when wetted.

Leaves not pungently toothed; flowers not in leafy-bracted heads.

Ovules 1–2 in each cavity.

Ovules several in each cavity.

Flowers in few-many-flowered clusters.

Flowers in few-flowered clusters.

Flowers in many-flowered heads.

Stems and leaves glandular-puberulent.

Stems and leaves glabrous or pilose.

Calyx glabrous or pilose; anthers included or but little exserted.

Calyx densely arachnoid-vilous; anthers well exserted.

Flowers scattered, terminating slender pedicels.

Corolla 6–10 mm. long, the tube little exceeding the calyx.

Calyx 4 mm. long; corolla 6 mm. long.

Calyx 2 mm. long; corolla 8–10 mm. long.

Corolla 15–30 mm. long, the tube much exceeding the calyx.

Leaves pungently toothed; flowers in leafy-bracted woolly-matted heads.

Annual.

Perennial.

1. *G. gilioides*.

2. *G. multicaulis*.

3. *G. achilleæfolia*.

4. *G. abrotanifolia*.

5. *G. staminea*.

6. *G. oreophila*.

7. *G. exilis*.

8. *G. grinnellii*.

9. *G. virgata*.

10. *G. densifolia*.

1. *G. gilioides* (Benth.) Greene. Loosely branching, erect or diffuse, 2–5 dm. high, commonly villous and glandular throughout; basal leaves and the lower cauline leaves pinnately-parted into

narrowly oblong or lanceolate divisions, or rarely all so divided, or the upper palmately divided into 3-5 obovate or lanceolate divisions; corolla 8-12 mm. long, salver-shaped, blue-purple; stamens unequally inserted; capsule globose; seeds 1-2 in each cell. (*Collomia gilioides* Benth.)

Frequent in shady places in the chaparral belt throughout our range.

2. *G. multicaulis* Benth. Branching from the base, 4-6 dm. high, nearly or quite glabrous; leaves pinnately parted into 5-9 linear and entire or toothed lobes; flowers few in the clusters, subsessile or on more elongated pedicels; calyx-teeth erect or recurved in fruit, the hyaline margin very narrow; corolla deep or rather pale purple, its proper tube shorter than the obovate lobes; stamens included; capsule ovoid.

Frequent on the plains and foothills in our coast region.

3. *G. achilleæfolia* Benth. Stems 3-5 dm. high, glandular-puberulent throughout; leaves mostly bipinnately dissected into linear, somewhat recurved segments; branches few, naked, bearing a dense cluster of usually deep blue flowers; calyx glandular-pilose, mainly hyaline, its lobes incurved in fruit; corolla-tube cylindric; throat very short and broad; lobes oblong, scarcely spreading; stamens exerted.

Common on dry plains and foothills throughout our range.

4. *G. abrotanifolia* Nutt. Herbage glabrous throughout or very sparsely pilose on the petioles and calyx; stems 3-6 dm. high, with a few ascending branches or simple naked above, bearing a terminal dense cluster of large pale blue flowers; leaves large, thin, 3-pinnately dissected, the segments very narrowly linear; calyx glabrous or sparsely pilose, mainly hyaline, recurved or spreading in fruit; corolla with funnelform throat and obovate lobes; stamens included or scarcely exerted.

Frequent in open places in the chaparral belt of all our mountains. This and the next have been called *G. capitata* Dougl., but that is a small-flowered species of Oregon.

5. *G. staminea* Greene. Closely resembling the last in habit; stems and leaves sparsely pilose; calyx densely arachnoid-villous, mainly hyaline, its lobes recurved; stamens well exerted, nearly white.

This species is common in the San Joaquin Valley and may occur within our limits.

6. *G. oreophila* Greene, n. sp. Stems simple or branching from the base, glandular-pilose above, 18-36 cm. high; lower leaves pinnate, the divisions slender with a few lobes, the upper pinnately-parted or pinnatifid; flowers loosely paniced; calyx 4 mm. long; corolla violet, 6 mm. long, narrowly funnelform, the tube scarcely equaling the calyx. (*G. inconspicua*, subsp. *sinuata*, var. *oreophila* Brand.)

Frequent in the chaparral belt of all the hills and mountains.

7. *G. exilis* (Gray) n. sp. Diffusely paniculate-branched above, 3-4 dm. high, glabrous below or the young parts somewhat arach-

noid-tomentose, more or less glandular above; basal and lower leaves simply pinnatifid, linear-lanceolate, 3–5 cm. long, with short ovate or triangular and cuspidate-tipped lobes, these often enlarged and toothed or lobed; the cauline few, becoming entire and subulate above; paniculate cymes very loose; flowers mostly on elongated almost capillary pedicels, about 1 cm. long, dilated-funnelform, abruptly contracted below into a narrow tube, which equals or slightly exceeds the calyx, its lobes rounded-obovate, purple, the throat yellowish below; capsule obovoid. (*G. latiflora exilis* Gray.)

Wilson's Peak under pines, and similar places throughout the San Gabriel Mountains.

8. *G. grinnellii* Brand. Loosely paniculate, branched above, 5–8 dm. high, hispid pubescent below, glandular above; basal leaves 4–6 cm. long, bipinnately parted or divided; the upper becoming simple, small and entire; branches loosely few-flowered; pedicels shorter than the flowers; corolla 2.5–3 cm. long, lilac color with purple tube, narrowly funnelform, tapering to the long slender tube; capsule ovoid-oblong.

Frequent in open pine forests in the San Gabriel.

9. *G. virgata* Steud. Annual, white-floccose, becoming glabrate; stems slender, either simple and virgate or with virgate branches from the base and paniculately branched above, 1–3 dm. high; leaves slender-filiform, the lower mainly entire and the upper rarely more than 3-parted; corolla blue or lavender, its tube 8–12 mm. long, surpassing the acerose calyx-lobes; anthers linear-sagittate, 2 mm. long.

Frequent in the foothills and plains in the interior region, mostly east of our limits.

9a. *G. virgata floribunda* Gray. Branches few, terminated by large, compact flower clusters; most of the leaves pinnately 3–7-parted; corolla somewhat larger than in the type.

On dry plains from Azusa eastward.

10. *G. densifolia* Benth. Perennial, canescent-lanate when young, becoming glabrate in age; stems rigid, branched from the woody base, usually somewhat spreading, 1.5–3 dm. high; leaves rigid, mostly pinnatifid or incisely laciniate into short subulate spinulose lobes; flowers densely clustered, capitate-glomerate; corolla violet-blue, its tube about 12 mm. long, 2–3 times the length of the calyx; anthers sagittate.

Occasional in open places, mostly on dry ridges, in the pine belt of all the mountains.

4. LEPTODACTYLON H. & A.

More or less woody or shrubby, commonly tufted, very leafy plants. Leaves commonly alternate, and much fascicled in the axils, palmately 3–7-parted, acerose-subulate, rigid and pungent. Flowers showy, solitary and sessile or few in clusters at the summit of the branches

or branchlets. Corolla salver-shaped, the throat somewhat funnelform. Filaments short, attached equally in or below the throat; anthers short, included. Capsule many-seeded. Seeds not mucilaginous.

1. *L. californicum glandulosum* (Eastw.) Abrams. Shrubby, 6–12 dm. high, the branches and very crowded leaves tomentose-pubescent and more or less glandular, leaf-segments narrowly linear, about 1.5 cm. long; corolla rose color or lilac, its limb 2–4 cm. in diameter, with broadly wedge-obovate lobes, their margins often minutely erose; ovules 20 or more in each cell. (*Gilia californica glandulosa* Easteo.)

Frequent in the chaparral belt. March–June.

5. *LINANTHUS* Benth.

Mostly low or slender annuals, with leaves opposite, or the upper rarely alternate, palmately divided to the base into narrowly linear or filiform divisions (appearing as if in whorls in some species), rarely entire. Flowers scattered or in terminal capitate clusters. Calyx-tube scarious between the ribs or angles, its teeth equal. Corolla varying from salver-shaped to subrotate. Stamens equally inserted on the corolla. Capsule with few-many seeds in each cell.

Annuals.

Corolla funnelform, scattered or few-flowered clusters.

Leaves entire; corolla-lobes fringed.

1. *L. dianthiflorus*.

Leaves palmately lobed or divided; corolla-lobes entire.

Flowers subsessile.

Flowers not yellow; calyx about 10 mm. long.

2. *L. concinnus*.

Flowers yellow; calyx about 5 mm. long.

3. *L. lemmoni*.

Flowers on slender pedicels.

Pedicels a little longer to twice as long as the yellow flowers.

4. *L. aurea*.

Pedicels several times longer than the flowers.

Filaments glabrous; corolla little exceeding the calyx.

5. *L. harknessii*.

Filaments pilose; corolla much exceeding the calyx.

6. *L. liniflorus*.

Corolla funnelform, the slender tube much exerted; flowers in bracted heads.

Corolla about 10 mm. broad.

7. *L. parviflorus*.

Corolla about 5 mm. broad.

Corolla tube long exserted; bracts
less densely ciliated.

8. *L. bicolor*.

Corolla tube but little exceeding the
densely ciliated bracts.

9. *L. ciliatus*.

Perennial, woody at base.

10. *L. floribundus*.

1. ***L. dianthiflorus*** (Benth.) Greene. Branching from the base, the branches decumbent or simple and erect, 4–12 cm. high, more or less pubescent; leaves all simple, narrowly linear; corolla short-funnelform, 2 cm. long or more, lilac with a darker or yellowish throat, the ample lobes from denticulate to strongly fringed-toothed; filaments inserted near the base of the tube; ovules 12–20 in each cell. (*Gilia dianthoides* Endl.)

Common in sandy soil in the coast and interior valleys. February–April.

2. ***L. concinnus*** Milliken. Dichotomously branched annual, 10–15 cm. high; stems puberulent, leaves 1 cm. long, the divisions slender; flowers solitary or in clusters of 3–4, very short pedicelled; calyx about 10 mm. long, the lobes subulate, pungent, the tube mainly hyaline; corolla tube proper about 1 mm. long, white, the throat funnelform, about 5 mm. long, yellowish, the lobes obovate, 6 mm. long, white with purple veins at the base; stamens included.

Mt. Pinos south to the San Jacinto Mountains; Elysian Park, according to Milliken. *Gilia modesta* Hall, not Phil.

3. ***L. lemmoni*** (Gray) Greene. Stems widely branching, about 10–15 cm. high, hirsutely pubescent; leaf-segments linear, 5–6 mm. long; flowers solitary or few in the axils and subsessile, but more densely clustered at the ends of the branches; calyx turbinate-prismatic, strongly 5-costate; lobes acerose-subulate, equaling the throat of the yellowish short-funnelform corolla; capsule many-seeded. (*Gilia lemmoni* Gray.)

Open places in the chaparral belt.

4. ***L. aureus*** (Nutt.) Greene. Nearly simple or more commonly diffusely branched, 5–15 cm. high; leaf-segments narrowly linear, 6 mm. long, hispidulous; pedicels seldom longer than the flowers; corolla open-funnelform, golden yellow; the lobes rounded obovate, widely spreading, equaling the tube; filaments inserted just below the sinuses, glabrous at base; seeds about 10 in each cell. (*Gilia aurea* Nutt.)

Frequent in the interior in dry washes.

5. ***L. harknessii*** (Curran) Greene. Stems very slender, diffusely dichotomously branched, pubescent; pedicels capillary; calyx 3 mm. long, the teeth subulate, barely half as long as the tube, hispid-ciliolate; corolla short-funnelform, little or not at all exceeding the calyx; seeds 3–4 in each cell.

Occasional on dry hillsides in our interior region.

6. ***L. liniflorus*** (Benth.) Greene. Stems slender, dichotomously branched, about 3 dm. high, glabrous; leaf-segments about 3, filiform; flowers on long slender pedicels in a loose cymose panicle; corolla with nearly obsolete tube; the limb rotate, 12–24 mm.

broad; the obovate entire lobes white, marked with 7 deep blue veinlets; stamens nearly as long as the corolla-lobes; filaments with a dense pilose ring near the base; ovules 6-8 in each cell. (*Gilia liniflorus* Benth.)

Frequent on plains and foothills nearly throughout the state, but known within our limits only on low hills near Trabuco Canyon, Santa Ana Mountains.

7. *L. parviflorus* (Benth.) Greene. Stems slender, branched from the base, 8-15 cm. high; leaf-segments linear or narrowly oblanceolate; corolla-tube very slender, 18-25 mm. long; throat yellow; lobes oval, 4-6 mm. long, mostly pale yellow or nearly white, tinged with red or brown on the outside; style and filaments half or more than half as long as the corolla-limb. (*Leptosiphon parviflorus* Benth.; *Gilia micrantha* Steud.)

Common on the plains and foothills throughout our range in sandy soil. March-April.

8. *L. bicolor* (Nutt.) Greene. Very near the last, but small, 5-7 cm. high; flowers rose-purple, the elongated corolla-tube 12-18 mm. long, the limb 4-6 mm. broad. (*Leptosiphon bicolor* Nutt.; *Gilia tenella* Benth.)

Wilson's Peak, Davidson.

9. *L. ciliatus* (Benth.) Greene. Stems rigid, strict, 1-2 dm. high, scabrous-pubescent; internodes long; leaves with 5-9 linear, rigidly and densely ciliate segments; corolla rose color, scarcely exceeding the floral leaves, its limb 4 mm. broad or less. (*Gilia ciliata* Benth.)

Wilson's Peak, growing in open grassy places among the pines. I have not seen Davidson's specimens, but I strongly suspect that they belong to this species rather than to *L. bicolor*, as listed by him. May-July.

10. *L. floribundus* (Gray) Greene. Stems erect, from a woody much branched base, 1-3 dm. high; leaves 15-25 mm. long, slender, acerose; flowers scattered or in loose clusters, on slender pedicels sometimes exceeding the flowers; calyx 6 mm. long, mainly herbaceous, the lobes equaling the tube, cuspidate; corolla 1 cm. long, the throat yellow with dark brown at the base, the lobes 5 mm. long, obovate, white.

Southern California and Arizona; Saddleback, Santa Ana Mountains.

Family 89. HYDROPHYLLACEAE. WATER-LEAF FAMILY.

Herbs or rarely shrubs, mostly hirsute pubescent or scabrous, with alternate or basal, rarely opposite leaves, and perfect regular 5-parted flowers in scorpioid cymes, spikes or rarely solitary. Calyx deeply cleft or divided, the sinuses sometimes appendaged. Corolla funnel-

form or more or less spreading. Stamens 5, inserted on the tube or base of the corolla and alternate with its lobes; filaments filiform; anthers versatile, 2-celled, longitudinally dehiscent. Ovary superior, 2-celled or 1-celled with 2 placentæ; styles 2, separate or united below; stigmas small, terminal; ovules few-many. Seeds various, usually pitted or somewhat roughened.

Style 1, 2-cleft or 2-parted.

Ovary 1-celled; the placentæ expanded and forming a sac-like lining to the pericarp.

Calyx with a reflexed lobe at each sinus. 1. NEMOPHILA.

Calyx naked at the sinuses. 2. EUCRYPTA.

Ovary 1-celled or becoming 2-celled by the meeting in the axis of the narrow or slightly dilated placentæ.

Corolla never yellow, or rarely yellowish, deciduous. 3. PHACELIA.

Corolla yellow, persistent. 4. EMMENANTHE.

Styles 2, distinct.

Herbs.

5. CONANTHUS.

Suffrutescent or shrubby.

6. ERIODICTYON.

1. NEMOPHILA Nutt.

Low diffuse slender or fragile more or less hirsute annual herbs, with alternate or opposite mostly pinatifid or lobed leaves, and mostly showy flowers, solitary and peduncled, lateral or terminal. Calyx deeply 5-cleft or 5-parted, with a reflexed or spreading appendage in each sinus. Corolla campanulate or rotate-campanulate, usually with 10 small appendages within at the base. Stamens included, inserted near the base of the corolla-tube; anthers ovate or oblong. Ovary 1-celled; style more or less 2-cleft; ovules 4-20. Capsule 2-valved. Seeds carunculate.

Leaves retrorsely scabrous with prickly hairs.

Corolla 12-25 mm. broad, deep purple. 1. *N. aurita*.

Corolla less than 10 mm. broad, usually pale. 2. *N. racemosa*.

Leaves glabrous or pubescent, not scabrous and prickly.

Corolla usually deep blue, 12-15 mm. broad. 3. *N. insignis*.

Corolla pale with purple veins, less than 10 mm. broad. 4. *N. integrifolia*.

1. *N. aurita* Lindl. Herbage scabrous with stout recurved prickly hairs, the smaller often uncinat; stems weak, clinging to

other plants for support by means of the prickles; leaves deeply pinnatifid, the lobes somewhat reflexed; petioles winged, clasping at base; flowers in few-flowered racemes at the ends of the branches; corolla 12–25 mm. broad, purplish violet; scales triangular, covering the base of the filaments; capsule globose; seeds 4, globular, favose-reticulated.

Common on shady slopes throughout our range below 3000 feet. March–April.

2. *N. racemosa* Nutt. Resembling the last in habit, but less prickly; leaves often bipinnatifid; petioles not strongly winged, not clasping; flowers distinctly racemose, less than 10 mm. broad, usually pale; scales narrow, the upper half commonly free.

Frequent among shrubs on shady slopes in the vicinity of San Diego, where it was first collected by Nuttall. It has also been collected on Catalina and San Clemente Islands. March–May.

3. *N. insignis* Dougl. Stems much branched, spreading, 1–3 dm. long, nearly glabrous or somewhat pubescent with more or less retrorse hairs; leaves mostly bipinnatifid, pubescent with spreading hairs, 2–5 cm. long, lobes elliptic-ovate; peduncles mostly 25–45 mm. long; calyx-lobes ovate-lanceolate, acute; corolla 15–25 mm. broad, rotate-campanulate, the tube scarcely half the length of the lobes, usually deep blue, slightly hairy toward the base; scales rather broad, ciliate; seeds usually 12, corrugate-roughened.

Frequent on sandy or dry plains and foothills throughout our range. The rather persistent cotyledons are usually spatulate. March–April.

4. *N. integrifolia* (Parish) Abrams. Stems usually much branched, rather weak and spreading, somewhat densely pubescent throughout with spreading hairs, the petioles nearly ciliate; leaves 2–3-toothed or pinnatifid, seldom entire; peduncles slender and usually exceeding the leaves; calyx-lobes lanceolate, acute and mucronulate; corolla usually less than 1 cm. broad, rotate-campanulate to nearly rotate, pale blue or nearly white, with darker veinlets, hairy toward the base; scales linear, the upper half usually free, hairy; seeds usually 8–12, corrugate-roughened, sometimes minutely so, globose. (*N. menziesii integrifolia* Parish.)

Rather common in the chaparral belt in all the hills and valleys, especially away from the coast. April–May.

2. EUCRYPTA Nutt.

Erect paniculately branched viscid annuals, with small racemose flowers. Calyx 5-parted, the sinuses naked. Corolla small, tubular-campanulate, without appendages. Capsule globose, 1-celled, with 2 dilated placentæ lining the pericarp, 2-valved, 8-seeded, 2 seeds remaining in each valve between the pericarp and the placentæ after dehiscence. Seeds corrugated or smooth.

1. *E. chrysanthemifolia* (Benth.) Greene. Stems rather slender, widely branching, 3–9 dm. high; leaves ample, 2–3-pinnatifid;

racemes short and close, scarcely surpassing the leaves; calyx-lobes ovate, acutish; corolla white or bluish, scarcely surpassing the calyx-lobes; free seeds oblong-oval, corrugated, the concealed ones flattened, smooth. (*Ellisia chrysanthemifolia* Benth.)

Common in the chaparral belt and in the open foothills. March-May.

3. PHACELIA Juss.

Annual rarely perennial mostly hirsute or hispid herbs, or rarely suffrutescent, with entire or variously lobed or dissected leaves, and often showy flowers in scorpioid spikes or racemes. Calyx deeply 5-parted, commonly more or less accrescent, unappendaged. Corolla from nearly rotate to campanulate, tubular or funnellform, deciduous, the tube commonly with internal lamellate projections or appendages. Stamens inserted on the base of the corolla-tube. Style 2-cleft. Capsule 1-celled, 2-valved, the thin septa-like placenta^æ adherent.

Ovules 4, 2 on each placenta; corolla with 10
laminate appendages in pairs at the base
of the stamens.

Leaves, at least the upper, entire.

1. *P. magellanica*.

Leaves all pinnatifid.

Fruiting calyx not conspicuously enlarged, herbaceous.

Perennial from a suffrutescent base.

2. *P. ramosissima*.

Annuals.

Sepals hispid.

3. *P. hispida*.

Sepals pilose.

Corolla scales free at the tip.

4. *P. distans*.

Corolla scales adnate to the tip.

5. *P. tanacetifolia*.

Fruiting calyx conspicuously enlarged, chartaceous.

6. *P. ciliata*.

Ovules more than 4, several-many on each placenta.

Appendages none.

Corolla usually about 15 mm. broad.

7. *P. viscida*.

Corolla usually about 25 mm. broad.

8. *P. grandiflora*.

Appendages present.

Appendages 5, small, truncate or emarginate, one adnate to the inner base of each filament.

Corolla-tube twice the length of the lobes.

9. *P. whillavia*.

Corolla rotate-campanulate, cleft to near the middle.

Corolla about 20 mm. broad, cleft beyond the middle.

10. *P. parryi*.

- Corolla about 10 mm. broad,
cleft scarcely to the middle. 11. *P. longipes*.
Appendages 10, vertical.
Styles cleft to the middle; seeds not
transversely corrugated.
Plants erect; flowers subsessile,
spicate. 12. *P. brachyloba*.
Plants decumbent; flowers loosely
racemose.
Leaves pinnatifid into many
lobes, the terminal lobe not
enlarged. 13. *P. douglasii*.
Leaves, at least the upper-
most, entire or with a few
lobes at the base of the
large terminal lobe. 14. *P. davidsonii*.
Styles cleft only at apex; seeds
strongly corrugated transversely. 15. *P. fremontii*.

1. *P. magellanica* (Lam.) Coville. Hispid and the foliage strigose, more or less canescent, 2-5 dm. high, from a perennial or biennial root; leaves lanceolate to ovate, acute, pinnately and obliquely straight-veined; the lower tapering into a petiole, and commonly some of them with 1-2 pairs of smaller lateral leaflets; inflorescence hispid, the dense spikes thyrsoïd-congested; corolla whitish or bluish, moderately 5-lobed, longer than the oblong-lanceolate or linear calyx-lobes; filaments much exerted, sparingly bearded.

Frequent on dry hillsides in the valleys and mountains.

2. *P. ramosissima suffrutescens* Parry. Perennial; stems much branched from the base, decumbent or ascending, lignescent at base, often 2 cm. or more in diameter; herbage hispid pubescent and more or less glandular above; leaves 5-9-divided or -parted, with oblong or narrower pinnatifid-incised divisions; spikes glomerate, short and dense; flowers subsessile, ascending in fruit; sepals ovate to obovate-oblongate; corolla bluish or dirty white; its lobes spreading or somewhat reflexed, short, scarcely as long as the diameter of the throat; stamens and style moderately exerted; capsule globose-ovoid; seeds deeply pitted, oval.

Common in the chaparral belt and on sand-dunes along the seashore. Specimens from Playa del Rey show 5 annular rings near the base.

3. *P. hispida* Gray. Annual (as are all the following species), 5 dm. high or less, diffusely branched, setose-hispid with long slender white bristles; leaves with rather few, coarse divisions the uppermost sometimes merely lacinate-incised; spikes soon loose and loosely paniculate; flowers on short slender horizontal pedicels; corolla very pale blue, rotate or campanulate; lobes rounded at apex; calyx-lobes narrowly linear with attenuate base nearly equaling the corolla, in fruit 8-12 mm. long and almost 4 times the length of the globose capsule; seeds short-oval, roughish-scrubulate.

Very common in the chaparral belt in open grassy places. April-June.

4. *P. distans* Benth. Stems much branched, ascending, 3–5 dm. high; herbage with scattered hispid hairs and close fine pubescence; leaves pinnately 9–17-divided into linear-oblong 1–2-pinnatifid or cleft divisions; spikes scattered, solitary or geminate; sepals unequal, narrowly obovate to spatulate; corolla 6–8 mm. long, rotate-campanulate, usually blue, rarely paler, the lobes rounded; internal appendages semioovate with free pointed tips; stamens little or not at all exerted.

Very common in the plains and foothills. March–May.

5. *P. tanacetifolia* Benth. Much resembling the last, but usually stouter, erect, sparsely branching or simple; leaves similar, larger and less finely dissected; spikes terminating the branches, approximate, 6–9 cm. long; sepals linear, beset with rigid bristles, in fruit little exceeding the oval capsule; corolla open-campanulate, 6–8 mm. long, lavender, the lobes blunt, not rounded; internal appendage entirely adnate, the tip rounded.

Slender specimens of this species were collected on the northern slope of the Santa Monica Mountains, between Cahuenga Pass and Encino, by the author in April, 1901; otherwise it is not known within our limits.

6. *P. ciliata* Benth. Branched from the base with rather simple ascending branches, 2–4 dm. high, herbage scabrous, otherwise glabrous; leaves pinnately divided, the divisions oblong, toothed or incised; spikes rather short, becoming loose in fruit; pedicels short or almost wanting; calyx-lobes lanceolate to broadly ovate, chartaceous, 7–10 mm. long in fruit, with thickened midrib and reticulations, sparsely bristly-ciliate; corolla blue; stamens shorter or about equaling the corolla; capsule ovate, mucronate, about half the length of the calyx-lobes, which are arched over it; seeds oval, foveate.

Open grassy hills, not common. Hollywood; Capistrano.

7. *P. viscida* (Benth.) Torr. Stem erect, mostly simple, 3–6 dm. high, very glandular above; leaves ovate or obscurely cordate, doubly or incisely and irregularly dentate, 2.5–6 cm. long; calyx-lobes linear or obscurely spatulate, obtuse, 7–8 mm. long; corolla deep blue with purplish or whitish center, rotate-campanulate, 10–20 mm. broad; capsule ovate, abruptly cuspidate-pointed, equaling the calyx.

Frequent in all the mountains bordering coast valleys, especially common on fire-swept places in the chaparral belt. March–May.

7a. *P. viscida albiflora* (Nutt.) Gray. Flowers white, otherwise as in the typical form.

Same range as the last but less common.

8. *P. grandiflora* (Benth.) Gray. Closely resembling the last, but usually more robust and more viscid; leaves larger; calyx-lobes linear, 8–10 mm. long; corolla rotate-campanulate, 2.5–4 cm. broad, purplish or pale bluish; capsule equaling the calyx, the cuspidate persistent and indurated, base of the style 2 mm. long.

Same range as the last and growing in similar places. April–May.

9. *P. whitlavia* Gray. About 3 dm. high, loosely branching, hirsute and glandular; leaves ovate or deltoid, incisely toothed; calyx-lobes linear; corolla with cylindraceous ventricose tube, usually about 2 cm. long and twice the length of the lobes, purple; appendages to the exerted filaments hairy.

Occasional on low hills and in the chaparral belt. Verdugo Hills; San Gabriel and Santa Ana Mountains.

10. *P. parryi* Torr. Stems more or less branching, the branches somewhat spreading; herbage hirsute or somewhat hispid and glandular; leaves ovate, irregularly and incisely doubly toothed or lacinate or the lowest sometimes pinnately lobed, the upper longer than the petioles, the lower on rather long slender petioles; racemes very loose; pedicels filiform, widely spreading; calyx-lobes narrow; corolla cleft beyond the middle, rotate-campanulate, deep violet, 2 cm. broad; filaments bearded, exerted; ovules on each placenta 20-30, and seeds 15-20.

Occasional in the chaparral belt in the interior region. Rather common in the Santa Ana Mountains and throughout the western part of San Diego County.

11. *P. longipes* Torr. Much resembling the last but more slender, loosely branching; cauline leaves roundish-oval or subcordate, coarsely and obtusely 5-8-toothed, about 12 mm. long, all shorter than the petioles; corolla about 1 cm. long, nearly white, 5-cleft barely to the middle; ovules on each placenta 8-10; seeds fewer.

"Rare and local in the San Gabriel Mountains," *Davidson*.

12. *P. brachyloba* (Benth.) Gray. Stems branched, erect, 3-6 dm. high, roughish-pubescent, viscid-glandular above; leaves pinnatifid, elongated, oblong or spatulate, short-petioled, lobes 7-15, entire or obtusely few-toothed; spikes crowded, solitary or geminate, at length much elongated and slender; pedicels very short; corolla white, campanulate, the lobes about half the length of the tube; the long narrow appendages nearly free from the stamens; ovules about 6, rarely more, on each placenta; capsule oblong-oval, very obtuse, membranous, shorter than the narrow spatulate calyx-lobes; seeds oval, reticulated.

Frequent in the upper portions of the chaparral belt of the San Gabriel Mountains. April-June.

13. *P. douglasii* (Benth.) Gray. Stems branched from the base; the branches prostrate or decumbent, 1-2 dm. long; herbage pubescent and hirsute with mostly spreading hairs; leaves elongated-oblong or linear in outline, pinnatifid or pinnately parted into several-many pairs of lobes, the terminal lobe not larger nor parallel-veined; racemes becoming elongated; pedicels filiform, 1-2 cm. long; calyx-lobes spatulate; corolla rotate-campanulate, pale blue, about 1 cm. broad; appendages semi-oblongate; ovules to each dilated placenta 12-14; capsule ovate, mucronate; seeds roundish, oval, scrobiculate.

Frequent near the coast along the borders of the sand-dunes. Much resembling some of the large-flowered *Nemophilas*.

14. *P. davidsonii macrantha* Parish. Stems branched from the base, decumbent, ascending or erect, 2-4 dm. long, rather soft pubescent and villous; leaves deeply pinnatifid into 2-4 triangular entire lobes and a much larger terminal one, the evident veins of which are nearly parallel, the upper leaves commonly entire and slender petioled; pedicels shorter than the fruiting calyx-lobes; calyx-lobes narrowly spatulate, fully twice the length of the ovate capsule; corolla 1 cm. high or more, the lobes dark purple, the throat and tube yellowish.

Frequent in the pine belt of the San Gabriel and San Bernardino Mountains. May-August.

15. *P. fremontii* Torr. Much branched from the base, 1.5-3 dm. high; leaves pinnatifid into 7-15 oblong or obovate entire or obtusely 2-3-lobed divisions; flowers crowded in the at length elongated spiciform racemes; corolla broadly funnelform, twice the length of the spatulate calyx-lobes; the long and narrow appendages united below with the filaments or almost free from them; capsule oblong; seeds 20-30, oblong, strongly and somewhat evenly corrugated.

Los Angeles River; Wilson's Peak, *Davidson*. Summit of Santiago Peak.

4. *EMMENANTHE* Benth.

Annuals with the habit of *Phacelia* and differing from that genus only by its yellow or cream-colored persistent corollas, destitute of appendages.

1. *E. penduliflora* Benth. (WHISPERING BELLS.) Erect, usually much branched from the base, 2-4 dm. high, villous-pubescent and somewhat viscid; lobes of the pinnatifid leaves numerous, short-toothed or incised; racemes loose, straight, ascending; pedicels filiform, as long as the flowers, these soon pendulous; calyx-lobes ovate, 6-8 mm. long; corolla cream-colored, campanulate, about 1 cm. long; filaments adnate to the base of the corolla; seeds about 16, pitted.

Common throughout the chaparral belt of all the mountains. April-June.

5. *CONANTHUS* Wats.

Low herbs or suffrutescent plants with entire leaves and purple bluish or white flowers. Calyx deeply 5-parted. Corolla funnelform or somewhat salver-shaped, the tube destitute of internal appendages. Stamens often unequal and unequally inserted, included. Styles 2, distinct to the base or rarely united; stigmas somewhat capitate. Capsule thin, completely or incompletely 2-celled by the meeting of the 2 thin and dilated placentæ, 2-valved, the valves entire. Seeds usually numerous.

1. *C. demissus* (Gray) Heller. Annual; stems much branched from the base and erect-spreading, 5-15 cm. high, pubescent, hir-

sute or somewhat hispid; leaves linear-spatulate, at least the lower tapering into a petiole; flowers subsessile in the forks; sepals very narrowly linear, not at all broadened above, 4-5 mm. long; corolla bright purple, about 1 cm. long; capsule oblong, about 3 mm. long, 10-16-seeded.

Occasional in dry places in the San Gabriel Mountains. Frequent on the desert.

2. *C. stenocarpus* (Gray) Heller. Erect, diffusely branched, at length procumbent, the branches 1.5-3 dm. long, leafy, villous-pubescent and somewhat viscid; leaves oblong, the upper with a broad sessile somewhat clasping base, the lower spatulate; flowers sessile or on short pedicels becoming rigid in fruit; corolla funnel-form, somewhat exceeding the linear sepals; capsule cylindric, 6 mm. long, nearly equaling the sepals; seeds very numerous.

Growing about the borders of ponds. Santa Monica, *Davidson*; Soldiers Home.

6. *ERIODICTYON* Benth.

Low shrubs or rarely herbaceous, with alternate more or less dentate leaves, and funnell-form or campanulate flowers in terminal panicles or scorpioid cymes. Sepals narrow, not dilated above. Filaments more or less adnate to the tube of the corolla, little or not at all exerted, sparsely hirsute. Ovary nearly or quite sessile, 2-celled by the meeting of the dilated placentæ in the axis. Capsule first loculicidal then septicidal, thus 4-valved; each valve with a short beak or acumination and closed on one side by the adherent dissepiment or half-partition.

Shrubs.

Leaves glutinous above.

1. *E. trichocalyx*.

Leaves silvery or canescent on both surfaces.

2. *E. crassifolium*.

Heavy-scented herbaceous perennial.

3. *E. parryi*.

1. *E. trichocalyx* Heller. Shrub, commonly 10-20 dm. high; leaves oblong to oblanceolate, tapering below and frequently above, dentate at least above the middle, very glutinous, the areas between the veins on the under side with a close dense felt; calyx 2 mm. long, with linear pubescent lobes; corolla white, tubular-funnelform, 5-7 mm. long; stamens and styles included.

Occasional in the chaparral belt of the San Gabriel Mountains. More common on the dry plains east of our range, as well as in the San Antonio and San Bernardino Mountains, where it extends up to the pine belt. May-August.

2. *E. crassifolium* Benth. Shrub, 25-30 dm. high, whitish tomentose with a more or less dense coat of short villous hairs, sometimes rusty-colored, branches leafy to the top; leaves oblong or oval, rigid, obtuse, 5-10 cm. long; cymes at length broad; calyx densely villous, the corolla slightly so; corolla somewhat salver-shaped and about twice the length of the calyx.

Frequent in the chaparral belt of the San Gabriel and Santa Ana Mountains. April-June. The form about Los Angeles is less silvery than the typical form about San Diego and has been called var. *nigrescans*.

3. *E. parryi* (Gray) Greene. Stems about 8-18 dm. high, woody below; branches rather simple and erect, hirsute or villous, viscid-glandular and strong-scented; leaves 5 cm. long, 1-1.5 cm. broad in the middle, tapering above to an acute apex and below to a very short petiole; the leaves at the base of the branches often much reduced, bullate and the margin strongly revolute; calyx-lobes narrowly linear, about 4 mm. long; corolla tubular-funnelform, about 15 mm. long, blue; stamens included, unequal; ovary oval, about 3 mm. long; seeds 4 or sometimes more. (*Nama parryi* Gray.)

Occasional in the San Gabriel, San Bernardino and Santa Ana Mountains. Occurring in the upper portions of the chaparral belt and in the lower portions of the pine belt. June-August.

Family 90. BORAGINACEAE. BORAGE FAMILY.

Herbs or rarely shrubs with mostly alternate exstipulate entire and pubescent leaves, and perfect regular or nearly so flowers in scorpioid spikes, racemes or cymes or rarely scattered. Calyx 5-lobed or 5-parted, usually persistent. Corolla 5-lobed, sometimes crested or appendaged in the throat. Stamens inserted in the tube or throat, alternate with the lobes; anthers 2-celled, longitudinally dehiscent. Ovary superior, of 2 2-valved carpels, these commonly 2-lobed appearing as 4 1-ovuled carpels; style simple, entire or 2-cleft. Fruit mostly of 4 1-seeded nutlets.

Ovary not lobed; glabrous perennial.

1. HELIOTROPIUM.

Ovary 4-lobed; hispid or pubescent annuals.

Flowers white.

Nutlets divergent, wing-margined and bristly, at least at apex.

2. PECTOCARYA.

Nutlets erect.

Nutlets inserted at the base; scar rounded.

3. ALLOCARYA.

Nutlets laterally inserted.

Scar rounded.

6. PLAGIOBOTHRYS.

Scar linear, often bifurcate at base.

Calyx circumscissile near the middle.

5. PIPTOCALYX.

Calyx not circumscissile.

Roots imparting a purple
stain; spikes leafy
bracted.

4. EREMOCARYA.

Roots not imparting a
stain; spikes naked.

7. CRYPTANTHE.

Flowers yellow.

8. AMSINCKIA.

1. HELIOTROPIUM L. HELIOTROPE.

Herbs or shrubs with alternate mostly entire petioled leaves, and small blue or white flowers in scorpioid spikes or scattered. Calyx-lobes lanceolate or linear. Corolla salver-shaped or funnelform, naked in the throat. Stamens included; filaments short or none. Style terminal, short or slender; stigma conic or angular. Fruit 2-4-lobed, separating into 4 1-seeded nutlets or into 2 2-seeded carpels.

1. *H. curvassavicum* L. Perennial, fleshy, glabrous throughout, more or less glaucous, branched, diffuse, the branches 15-45 cm. long; leaves oblanceolate or sometimes linear, 2.5-5 cm. long, obtuse at the apex, narrowed into petioles or the upper sessile; scorpioid spikes densely flowered, bractless, mostly in pairs; flowers about 4 mm. broad; calyx-segments lanceolate, acute; corolla white or rarely lavender; stigma annular.

Common in low saline places.

2. PECTOCARYA DC.

Low slender annuals with strigose-hirsute pubescence, small narrow leaves, and small white flowers scattered along the stems and branches. Calyx deeply 5-cleft, spreading or reflexed in fruit, persistent. Corolla with a circle of processes or crests which almost close the throat. Stamens included. Nutlets flat, thin, radiately divergent, bordered at apex or all around with a row of hooked bristles.

Nutlets with entire winged margins, uncinat only
at apex.

1. *P. penicillata*.

Nutlets beset with uncinat bristles on the
margins.

Nutlets 4 mm. long.

2. *P. linearis*.

Nutlets 1 mm. long.

3. *P. setosa*.

1. *P. penicillata* (H. & A.) DC. Closely resembling the last in habit, usually smaller and densely canescent with appressed hairs throughout; nutlets oblong, 2 mm. long, the apex covered with slender uncinat bristles, the winged margin entire, incurved, somewhat broader at the base and sometimes bearing 1 or 2 uncinat bristles.

Common in all valleys and foothills, mostly in dry ground.

2. *P. linearis* (R. & P.) DC. Stems slender, diffusely branched from the base, decumbent or ascending, canescent throughout with appressed hairs, the leaves with spreading hairs; nutlets oblong, 4 mm. long, becoming recurved, the winged margins toothed, the teeth ending in an uncinat bristle, the apex thickly beset with slender uncinat bristles.

Frequent on the mesas in the coast valleys and in moist places in the interior region.

3. *P. setosa* Gray. Stems erect, 4-6 cm. high, yellowish green, canescent with appressed hairs; calyx with a few strong hispid hairs; nutlets broad, about 1 mm. long, beset on the margins and inner surface with uncinat bristles.

First collected on the Mojave Desert. Common on the desert slopes of the San Gabriel, San Bernardino and Cuyamaca Mountains.

3. ALLOCARYA Greene.

Mostly low spreading annuals, with linear entire leaves, the lowest opposite, and small flowers in terminal spikes or racemes. Pedicels thickened at the summit and persistent. Calyx 5-divided, persistent, the segments narrow. Corolla salver-shaped, white, yellow in the throat. Stamens included. Ovary 4-divided; style short. Nutlets crustaceous, smooth or rough, attached at their bases or below the middle to the receptacle, the scar of the attachment concave or raised.

1. *A. trachycarpa* (Gray) Greene. Stem branching from the base, decumbent, 3 dm. long or less, rough with a rather coarse and somewhat spreading pubescence; racemes leafy almost throughout; segments of the calyx linear, widely spreading; corolla very small; nutlets ovate, straight, carinate on both sides, the dorsal keels and nearly straight transverse rugæ dentate-interrupted; scar sub-orbicular, nearly basal.

In low ground near Inglewood.

4. EREMOCARYA Greene.

Hirsute-canescant low annuals with numerous leafy-bracted racemose branches. Roots imparting a purple stain. Leaves in a basal rosulate tuft. Racemes dense, biserial, leafy-bracted; pedicels filiform, short and persistent with the calyx. Calyx 5-parted to the base, campanulate in fruit, its lobes nerveless, not bristly. Corollas small, white. Nutlets neither margined nor carinate, erect, attached for their whole length, the groove open, slightly dilated and not furcate at base. Style enlarged in fruit and persistent.

1. *E. micrantha* (Torr.) Greene. Hirsute-canescant throughout; stems slender, erect, diffusely branched from the base, 6–12 cm. high; leaves linear, 4–10 mm. long; flowers crowded; corolla scarcely 2 mm. long, its lobes about 1 mm. long, obscurely appendaged at the throat; nutlets oblong-ovate, acuminate, smooth or nearly so, about 1 mm. long.

Frequent in dry washes in the interior valleys.

2. *E. lepida* (Gray) Greene. Stems stouter than in the last, 8–15 cm. high; corolla larger, its limb 4–6 mm. broad, appendages conspicuous; nutlets nearly 2 mm. long, pectinate-scarious.

Frequent in the dry interior foothills of San Diego and San Bernardino Counties.

5. PIPTOCALYX Torr.

Hispid-canescant low diffusely branching annuals, leafy-racemose throughout. Calyx villous-hispid, 5-cleft to the middle, circumscissile near the middle, the lower scarious part together with the short pedicel persistent; the lobes herbaceous, filiform, hispid-bristly, nerveless. Nutlets 4, not carinate, margined, scarious-roughened or smooth and shining, the ventral groove divaricate-forked at base.

1. *P. circumscissus* (H. & A.) Torr. Strongly hirsute-canescant throughout; stems much branched from the base, forming rounded tufts, 4–6 cm. high; leaves linear, those of the racemes 4–5 mm. long; flowers crowded; corolla minute, naked; nutlets oblong-ovate, acute, smooth or minutely punctulate-scarious.

Frequent in dry stony or sandy places in the interior foothills and mountains. Mount Wilson; Lytle Creek Canyon; Bear Valley.

6. PLAGIOBOTHRYS F. & M. POP-CORN FLOWER.

Rather large but slender annuals with most of their leaves in a close basal tuft, the elongated branches erect or decumbent. Racemes spike-like, elongated, loose, naked or leafy-bracted; pedicels very short, filiform, persistent. Calyx 5-cleft or 5-parted, closed or campanulate, often irregularly circumscissile near the base. Nutlets carinate on both sides toward the apex, usually with well-defined lateral margins, the back very irregularly rugose; insertion almost medial on a depressed gymno-base; areola or scar rounded, rarely stipitate.

Nutlets not stipitate.

Calyx cleft nearly to the base.

Calyx cleft only to the middle.

Nutlets stipitate.

1. *P. canescens*.

2. *P. nothofulvus*.

3. *P. cooperi*.

1. *P. canescens* Benth. Stems much branched from the base, decumbent or ascending, 2-4 dm. long; pubescence pale, soft-villous; calyx cleft nearly to the base, the segments broadly lanceolate, 4-6 mm. long in fruit; nutlets 2 mm. long, incurved-connivent, rugose-reticulate, the areola longer transversely, the lateral angles very distinct.

Frequent in grassy places in interior valleys and foothills.

2. *P. nothofulvus* Gray. Stems 1-several from the depressed rosette tuft of leaves, erect or suberect, 3-6 dm. high, branching mostly above, silky-villous, the hairs reddish when young, especially on the calyx; leaves oblong-obovate or oblanceolate; spikes leafless; calyx cleft only to the middle, 3 mm. long in fruit, circumscissile below the middle; nutlets with dot-like granulations between the rather prominent rugæ.

Frequent on rather moist grassy hillsides about Los Angeles and on mesas in the coast region.

3. *P. cooperi* Gray. Diffusely branched from the base with slender sparsely-leaved ascending flowering stems, 1.5-3 dm. long, hispidulous; leaves spatulate-linear to oblong-lanceolate; spikes at length sparsely-flowered, sparingly bracteate or above bractless; corolla-limb 4-6 mm. broad; nutlets trigonous and reticulate-rugose, dentate-muriculate on the reticulations.

Occasional on moist grassy slopes in the coast valleys.

7. CRYPTANTHA Lehm.

Mostly low erect branching setose or hispid annual herbs, with narrow alternate entire leaves, and small mostly white flowers, in scorpioid bractless or bracteolate spikes. Calyx 5-parted or 5-cleft, at length deciduous, erect or spreading in fruit. Corolla small, funnelform, usually with 5 scales closing the throat. Stamens included; filaments short. Ovary 4-divided; style short; stigma capitate. Nutlets erect, rounded on the back, the margins obtuse acute or winged, attached laterally to the conic or elongated receptacle, scar elongated.

Nutlets muricate.

Calyx-lobes but little exceeding the nutlets in fruit.

Calyx-lobes about twice the length of the nutlets in fruit.

Nutlets strongly muricate, gray.

Corolla about 6 mm. broad; sepals 6-8 mm. long in fruit.

Corolla less than 4 mm. broad; sepals 3-5 mm. long in fruit.

Nutlets faintly and sparsely muricate, brown.

Nutlets smooth and shining.

1. *C. muriculata*.

2. *C. barbiger*.

3. *C. intermedia*.

4. *C. ambigua*.

Fruiting calyx erect and appressed to the stem.

5. *C. flaccida*.

Fruiting calyx not appressed to the stem.

Nutlets 1 in fruit.

6. *C. microstachys*.

Nutlets 4 in fruit.

7. *C. leiocarpa*.

1. *C. muriculata* (A. DC.) Greene. Rather stout, branching, rough-hirsute or hispid, 2-4 dm. high, with well-developed rather dense spikes, mostly in 2's and 3's at the ends of the branches; calyx about 3 mm. long, lanceolate; corolla 4-6 mm. long; nutlets 2 mm. long, muricate-papillose and somewhat rugose on the back; ventral groove and its basal bifurcation mostly closed, lateral angles acutish, distinct.

Frequent in the upper portions of the chaparral belt and in the pine belt of the mountains.

2. *C. barbiger*a (Gray) Greene. Rather stout, much branched, 2-4 dm. high, hispid and hirsute; leaves narrowly linear; spikes elongated, the flowers becoming rather distant; calyx-lobes linear, attenuate, 6-8 mm. long in fruit, covered with long shaggy bristles, usually intermingled with long white villous hairs; corolla often 6 mm. broad; nutlets rarely acuminate, about 2 mm. long, grayish, muricate-papillose; scar open, dilated at base.

Common in open dry places on the plains and foothills. March-May.

3. *C. intermedia* (Gray) Greene. Resembling the last in habit; calyx-lobes 3-5 mm. long, armed with rather rigid and pungent, whitish or rusty-yellowish bristles; corolla usually less than 4 mm. broad; nutlets grayish, about 2 mm. long, oblong-ovate, thickly rough-muricate; scar wholly or partly open, with an open areola.

Frequent on dry open ridges and on the plains in the interior region. March-May.

4. *C. ambigua* (Gray) Greene. Stems rather slender, loosely branching, 20-25 cm. high, sparsely hispid and hirsute; leaves rather broadly linear; flowers becoming scattered; calyx-lobes 5-7 mm. long, beset with rather short, rigid bristles; corollas about 3 mm. broad; nutlets deltoid-ovate, 2 mm. long, brownish, sparsely and faintly muricate.

Occasional in the upper portions of the chaparral belt and among the pines. May-July.

5. *C. flaccida* (Lehm.) Greene. Slender, strict, 3-6 dm. high, strigulose with minute close pubescence; leaves linear, minutely more or less strigulose-hispid; calyx erect in fruit, appressed to the rachis, 4-5 mm. long; sepals filiform-linear, thickish below, their bases very hispid with deflexed and strong, somewhat hooked bristles; nutlets solitary, scarcely flattened ventrally, the groove of attachment enlarged at base but not furcate. (*Krynitzkia oxycarya* Gray.)

Known in our region only from Chatsworth Park.

6. *C. microstachys* Greene. Rarely over 3 dm. high, much branched from the base, hispidulous or hispid; calyx in fruit ascending or erect, but not appressed to the rachis, 2-3.5 mm. long; sepals

linear, hispid with widely spreading, but not deflexed, straight and somewhat pungent hairs; nutlet solitary, somewhat flattened laterally, the groove of attachment divaricately forked and somewhat open at the base.

Frequent in sandy soil in the foothills throughout our range. Our plants usually somewhat canescent, but otherwise not differing from the northern form.

7. *C. leiocarpa* (F. & M.) Greene. Commonly branched from the base, 1–3 dm. high; spikes leafy bracted, the terminal larger and interrupted, the lateral short and glomerate; sepals short-linear, hispid bristly; nutlets 4, narrowly ovate, acute, 1.5 mm. long, the ventral groove not forked or scarcely so.

Frequent on the sand-dunes along the seashore.

8. *AMSINCKIA* Lehm.

Hispid annual herbs with erect or spreading branched stems, alternate linear leaves, and yellow flowers in elongated scorpioid spikes. Calyx herbaceous; sepals 5 or 4, by the union of 2 into 1 broader one. Corolla salver-shaped, the throat somewhat funnelform with more or less distinct folds but destitute of crests or processes. Filaments short. Style filiform; stigma capitate, 2-lobed. Nutlets crustaceous, erect or incurved, smooth or rough, triquetrous or ovate-triangular.

1. *A. spectabilis* F. & M. Stems erect, 3–6 dm. high, often branched at base, the branches spreading or decumbent; herbage sparsely hispid, the hairs with very pustulate bases; leaves linear-lanceolate, bright green; calyx-lobes lanceolate-linear, hispid with usually fulvous hairs; corolla orange-colored, usually 8–10 mm. long, the throat glabrous; anthers unequally inserted in the throat; nutlets reticulate-rugose and granulate, dark-colored.

Common in sandy soil near the coast, and apparently passing into the next. These plants have long been considered as belonging to *A. lycopsoides* Lehm., but that is a small-flowered species which has a bearded throat. It belongs to the seaboard and ranges from San Francisco to Vancouver Island. In applying the name *A. spectabilis* to the narrow-leaved plant of the interior valleys of middle California, recent authors have clearly erred; for Fischer and Myer's specimens came from the seacoast at Bodega Bay, where the form we have in mind is common. February–June.

2. *A. intermedia* F. & M. Stems erect, in robust plants much branched and more or less spreading; herbage hirsute and hispid throughout; leaves linear-lanceolate or linear, often canescent; calyx-lobes linear-lanceolate, much exceeding the nutlets, hispid with white or somewhat fulvous hairs; corolla orange or yellow, usually less than 8 mm. long, the throat glabrous; nutlets reticulate-rugose and granulate, usually pale.

A very common weed in all the valleys and foothills. February–June.

Family 91. VERBENACEAE. Vervain Family.

Herbs or shrubs with usually opposite or verticillate leaves, and perfect more or less irregular flowers in terminal or axillary spikes, racemes or panicles. Calyx usually 4-5-lobed or 4-5-cleft, persistent. Corolla regular or 2-lipped, the tube usually cylindric, the limb 4-5-cleft. Stamens usually 4, didynamous, rarely only 2, inserted on the corolla and alternate with its lobes; anthers 2-celled, the sacs longitudinally dehiscent. Ovary superior, 2-4-celled, composed of 2 carpels with 2 ovules; style simple; stigmas 1 or 2. Fruit dry, separating at maturity into 2 or 4 nutlets, or a drupe containing the 2-4 nutlets.

Corolla 5-lobed, regular or nearly so; nutlets 4.
Corolla 4-lobed, 2-lipped; nutlets 2.

1. VERBENA.
2. LIPPIA.

1. VERBENA L.

Herbs, mostly with opposite leaves and variously colored bracted flowers in terminal solitary, corymbose or paniced spikes. Calyx usually tubular, 5-angled, more or less unequally 5-toothed. Corolla salver-shaped or funnelform, its limb spreading, 5-lobed and slightly 2-lipped or regular. Stamens 4, didynamous or rarely only 2, included; connective of anthers unappendaged or sometimes provided with a gland. Ovary 4-celled; ovules 1 in each cell; style usually stout, 2-lobed, only 1 of the lobes stigmatic. Fruit dry, mostly enclosed by the calyx, at length separating into 4 1-seeded, linear or linear-oblong, smooth or rough nutlets.

Bracts shorter than the flowers.

Calyx scabrous, scarcely 2 mm. long.

Calyx glandular-villous, 4 mm. long.

Bracts longer than the flowers.

1. *V. urticifolia*.

2. *V. prostrata*.

3. *V. bracteosa*.

1. *V. urticifolia* L. Stems minutely hirsute-pubescent to almost glabrous, erect, 10-16 dm. high; leaves thin, petioled, ovate to oblong-lanceolate, acuminate or acute, evenly or doubly serrate; spikes slender-filiform, paniced; bracts ovate, acuminate, shorter than the calyx; corolla 2-4 mm. long, white or purplish.

Occasional in marshes.

2. *V. prostrata* R. Br. Soft-villous to hirsute, diffusely spreading, at length much branched, 5-9 dm. long; leaves obovate or oblong, with cuneate base tapering into a margined petiole, veiny, acutely incised and serrate, often 3-5-cleft; spikes solitary or somewhat clustered, elongated, hirsute or villous; bracts subulate, shorter than the calyx; corolla violet or blue, 4 mm. long; nutlets oblong.

Common on the plains and in the foothills throughout our range.

3. *V. bracteosa* Michx. Hirsute, much branched from the base, the branches diffuse or decumbent, 2-4 dm. long; leaves cuneate-obovate, narrowed into a short-winged petiole, pinnately incised or 3-cleft and coarsely dentate; spikes thick, terminating the branches; lowest bracts often pinnatifid or incised, the others lanceolate, acuminate, entire, rigid, all exceeding the flowers; corolla purplish or blue.

Occasional in low ground, especially in the bottoms of dried up ponds. June-September.

2. *LIPPIA* L.

Perennial herbs with opposite sometimes verticillate or rarely alternate leaves, and small bracted flowers in axillary or terminal heads or spikes. Calyx small, membranous, ovoid, campanulate or compressed and 2-winged, 2-4-toothed or 2-4-cleft. Corolla cylindric, the limb oblique, spreading, somewhat 2-lipped, 4-cleft, the lobes broad, often retuse or eroded. Stamens 4, didynamous; anthers not appendaged, the sacs nearly parallel. Ovary 2-celled; ovules 1 in each cell; style short; stigma oblique or recurved. Fruit dry with a membranous exocarp, at length separating into 2 nutlets.

1. *L. lanceolata* Michx. Green, glabrous or very sparingly pubescent with forked hairs; stems slender, weak, procumbent or ascending, often rooting at the nodes, simple or little branched, 3-6 dm. long; leaves thin, oblong, ovate or ovate-lanceolate, short-petioled, acute, sharply serrate to below the middle, narrowed at base, 2.5-7 cm. long; peduncles axillary, slender, usually longer than the leaves; heads at first globose, becoming cylindric, about 15 mm. long in fruit; bracts acute; calyx flattened, 2-cleft; corolla pale blue, scarcely longer than the calyx.

Occasional along slow-running streams in marshy places. June-August.

Family 92. MENTHACEAE. MINT FAMILY.

Aromatic punctate herbs or shrubs, with mostly 4-sided stems, simple opposite exstipulate leaves, and irregular perfect flowers variously clustered. Calyx regular

or 2-lipped, 5-toothed or 5-lobed, or rarely 4-toothed or 4-lobed, persistent. Corolla mostly 2-lipped; upper lip usually 3-lobed. Stamens inserted on the corolla-tube, generally 4 and didynamous, sometimes 2 with or without staminodia; anthers 2-celled, introrse or confluent 1-celled. Ovary superior, 4-lobed or 4-parted; style 2-lobed. Fruit of 4 1-seeded nutlets.

Flowers solitary in the axils.

Calyx gibbous on the upper side.

2. SCUTELLARIA.

Calyx not gibbous on the upper side.

Trailing herbs; flowers small.

8. MICROMERIA.

Shrubby; flowers large.

7. SPHACELE.

Flowers not solitary.

Calyx regular or its teeth nearly equal.

Stamens twice the length of the slender, curved corolla.

1. TRICHOSTEMA.

Stamens not twice the length of the corolla.

Corolla nearly regular.

Flower-whorls axillary.

Stamens 4.

12. MENTHA.

Stamens 2.

11. LYCOPUS.

Flowers in terminal bracteate heads.

9. MONARDELLA.

Corolla evidently bilabiate.

Stamens included in the corolla-tube.

3. MARRUBIUM.

Stamens exceeding the corolla-tube.

Lower pair of stamens the longer.

4. STACHA.

Stamens nearly equal.

10. KOELLIYS.

Calyx bilabiate or its teeth unequal.

Upper corolla-lip erect; filaments short; the connective transverse, the lower portion evident.

5. SALVIA.

Upper corolla-tip spreading; connective nearly continuous with the filament, the lower portion not evident or indicated by a tooth.

6. RAMONA.

1. TRICHOSTEMA L. BLUE-CURLS.

Annual or perennial strong-scented herbs or rarely shrubby, with lanceolate, oblong or linear, entire or slightly repand leaves, and small or middle-sized, usually blue or purple flowers, paniculate or in axillary loose or dense clusters. Calyx campanulate, very unequally 5-lobed. Corolla-tube slender, exerted or included, the limb somewhat oblique and deeply 5-cleft into oblong more or less declined segments. Stamens 4, didynamous, ascending, curved, the anterior pair longer;

filaments filiform, spirally coiled in the bud, long exerted; anther-sacs divaricate, more or less confluent at the base. Ovary deeply 4-lobed; style 2-cleft at the summit.

1. **T. lanceolatum** Benth. Strong-scented annual, simple or branching from near the base, 1.5–3 dm. high, very leafy, herbage cinereous or villous-pubescent and minutely glandular; leaves lanceolate, acuminate, sessile or the lowest subsessile, with 3–5 strong, nearly parallel nerves, 2 cm. long; cymes short-peduncled or nearly sessile; calyx villous; corolla almost filiform, somewhat pubescent, blue.

Frequent in dry fields, especially on the mesas in interior valleys. June–September.

2. **T. lanatum** Benth. (ROMERO or WOOLLY BLUE-CURLS.) Shrubby, about 1 m. high, very leafy; leaves thickish, narrowly linear and with revolute margins, 1-nerved, glabrate and shining above, canescent-tomentose beneath, sessile, many fascicled in the axils, uppermost reduced to bracts; cymes in a naked terminal, interrupted thyrsus, whole inflorescence clothed with a dense violet or purple wool; corolla 1 cm. long; the filaments fully twice as long.

Occasional in the chaparral belt on dry ridges in all the mountain ranges and extending northward as far as Monterey County.

2. SCUTELLARIA L. SKULLCAP.

Annual or perennial herbs, with flowers solitary or 2–3 together in the axils or in bracted racemes or spikes. Calyx campanulate, gibbous, bilabiate, the lips entire, the upper with a crest or protuberance upon its back, often deciduous in fruit, the lower persistent. Corolla much exerted, dilated above into the throat, glabrous within, upper lip arched, entire or emarginate, the lower spreading or deflexed, its lateral lobes small and somewhat connected with the upper, its middle lobe broad, sometimes emarginate, the margins mostly recurved. Stamens 4, didynamous, ascending under the upper lip, the upper pair somewhat shorter; anthers ciliate, the upper pair 2-celled, the lower 1-celled. Style unequally 2-cleft at the apex; ovary deeply 4-parted. Nutlets subglobose or depressed, papillose or tuberculate.

1. **S. tuberosa** Benth. Perennial by tuberiferous rootstocks, soft-pubescent or villous; stems slender, often diffuse, 3–12 cm. high, rather sparsely leafy; leaves mostly ovate, truncate or cuneate at the base, thin, coarsely and obtusely few-toothed or nearly entire, 1–4 cm. long, nearly all petioled; floral about equaling or longer than the flowers; corolla narrow, about 15 mm. long, blue.

Occasional in shady places in all the hills and in the chaparral belt of the mountains. April–June.

2. *S. bolanderi* Gray. Perennial by filiform rootstocks, pubescent; stems slender, simple or branched from the base, about 3 dm. high, very leafy to the summit; leaves ovate-elliptic, very obtuse, closely sessile by somewhat cordate base, 2.5 cm. long or less; flowers short-pedicelled, seldom equaling the leaf; corolla yellowish, throat inflated, villous within.

Moist woods, El Monte, *Davidson*.

3. MARRUBIUM L. HOARHOUND.

Perennial, mostly woolly herbs, with dentate rugose leaves, and small flowers in dense axillary clusters. Calyx tubular, 5-10-nerved, regularly 5-10-toothed, the teeth acute or aristate, spreading or recurved in fruit. Corolla-limb 2-lipped, the upper lip erect, entire or emarginate, the lower spreading, 3-cleft, its broader middle lobe commonly emarginate. Stamens 4, didynamous, included, the posterior pair the shorter; anthers 2-celled, the sacs divergent. Style 2-cleft at the summit, the lobes short. Ovary deeply 4-lobed. Nutlets ovoid, smooth.

1. *M. vulgare* L. Stems stout, tufted, erect, white-woolly, 3-10 dm. high; leaves roundish crenate, except at the cuneate truncate or subcordate base, petioled, white-woolly beneath, green above, 2-4 cm. long; flowers whitish; calyx-teeth usually 10, subulate.

Common in waste places. Flowering nearly all the year.

4. STACHYS L. HEDGE-NETTLE.

Annual or perennial, commonly pubescent or hispid herbs, with mostly purplish flowers loosely clustered in terminal dense or interrupted spikes. Calyx mostly campanulate, 5-toothed, the teeth nearly equal, erect or spreading, pointed. Corolla-tube not dilated at the throat, narrow; the limb strongly 2-lipped, the upper lip erect or slightly turned back, overarched or concave, entire or emarginate, lower lip spreading, 3-lobed, the middle lobe broader than the often deflexed lateral ones, sometimes 2-lobed. Stamens 4, didynamous, ascending under the upper lip, the anterior pair the longer, sometimes deflexed or twisted after anthesis; anthers contiguous in pairs. Ovary deeply 4-lobed; style 2-cleft, the lobes subulate. Nutlets ovoid or oblong.

1. *S. albens* Gray. Soft-tomentose or lanate with white wool, 3-15 dm. high, leafy; leaves oblong to ovate, usually with a more or less cordate base, acutish at apex, 5-8 cm. long, the lower short-petioled, the upper nearly sessile, the floral mostly shorter than the

dense interrupted capitate clusters of the virgate spikes; calyx turbinate-campanulate, the teeth triangular, aristulate, nearly equaling the corolla-tube; corolla as in the last.

Frequent along marshes and streams in the valleys and extending into the pine belt of the mountains. May–August.

2. *S. californica* Benth. Stems rather slender, simple from the base or branched, 4–8 dm. high, sparsely retrorsely hispid, especially on the angles, and more or less glandular with sessile glands; leaves ovate-oblong, subcordate at the base, the lowest rather long-petioled, sparsely villous-hispid, crenate; flowers about 6 in the whorls, these rather remote; calyx campanulate-turbinate, the teeth triangular, cuspidate, spreading in age; corolla purple, its tube about twice the length of the calyx, with a horizontal hairy ring at its base within.

Frequent on shaded slopes and in canyons in all the mountains and foothills. April–July.

5. SALVIA L.

Herbs or suffrutescent plants, aromatic and bitter, with clustered usually showy flowers. Calyx bilabiate, its upper lip usually 3-toothed or entire, the lower 3-cleft. Corolla deeply 2-lipped, erect, entire, emarginate or 2-lobed, usually concave, the lower spreading, its middle lobe often emarginate. Anther-bearing stamens 2, the posterior pair wanting or rudimentary; filaments usually short; connective of the anthers transverse, linear or filiform, bearing a perfect anther-sac on its upper end, its lower end dilated, capitate or sometimes bearing a small or rudimentary anther-sac. Ovary deeply 4-parted; style 2-cleft. Nutlets smooth, usually developing mucilage and spiral tubes when wetted.

1. *S. carduacea* Benth. (THISTLE-SAGE.) Rather stout erect annual, 2–5 dm. high; stem with a cluster of ample sinuate-pinnatifid spinulose-toothed leaves at base, these and the whole plant white-woolly and thistle-like; flowers in 1–4 dense head-like verticillate clusters, these 2–3 cm. broad, equalled or surpassed by the ovate-lanceolate pectinate-toothed bracts; calyx long-woolly, many-nerved; corolla light blue, 2.5 cm. long; upper lip erose-denticulate and cleft; lower with a large flabelliform fimbriately many-cleft middle lobe; filaments very short; lower arm of the long filiform connective bearing a polleniferous anther-cell.

Occasional in sandy soil in all the valleys and in the foothills. March–May.

2. *S. columbariae* Benth. (CHIA or SAGE.) Slender annual, branching and leafy below, 2–5 dm. high, naked and peduncle-like above, more or less grayish pubescent with rather short reflexed hairs; leaves rugulose, 1–2-pinnatifid into toothed or incised divisions;

flowers in 1-several dense verticillate clusters, these about 1.5-2 cm. broad, scarcely equalled by the rounded bracts; bracts tipped with a slender awn, sparsely ciliate on the margins; calyx-lobes purplish tipped, the upper lip large, arched, tipped with a pair of partly connate short-awned teeth; corolla deep blue, hardly exceeding the calyx, the upper lip small, notched, the lower with small lateral lobes and a large unguiculate transversely oval 2-lobed middle one.

Frequent throughout our range in the foothills and on the plains. March-May.

6. RAMONA Greene.

Perennial aromatic herbs or shrubby plants, with rugose veiny mostly crenulate leaves, and rather showy flowers, capitate-glomerate or sometimes more open and paniculate. Calyx bilabiate, mostly deeply cleft on the lower side as if spathaceous. Corolla strongly 2-lipped, the upper lip spreading, 2-lobed or emarginate. Anther-bearing stamens 2; filaments slender, exserted, apparently simple and bearing a linear 1-celled anther, or with an articulation showing that the portion above it answers to a filiform connective, the lower end of which sometimes projects into a subulate point. Otherwise as in *Salvia*. (*Audibertia* Benth.)

Herbaceous perennial.
Shrubs.

1. *R. grandiflora*.

Flowers in dense verticillate glomerules forming interrupted spikes.

Leaves hoary on both surfaces.

2. *R. nivea*.

Leaves green and rugose above.

3. *R. stachyoides*.

Flowers in thyrsoid-panicles.

4. *R. polystachya*.

1. *R. grandiflora* (Benth.) Briquet. Herbaceous, very villous and glandular, aromatic; stems stout, 3-6 dm. high; lowest leaves hastate-lanceolate, obtuse, 8-20 cm. long, on margined petioles, the upper oblong, sessile, all very rugose, sinuate-crenate, white-tomentose beneath; flowers densely capitate-glomerate in large interrupted spicate heads; bracts broadly ovate, entire; calyx spathaceous, the orifice oblique, 2 lower teeth very short; corolla crimson, 3 cm. long.

Frequent on shaded banks in all the mountains. March-May.

2. *R. nivea* (Benth.) Briquet. Shrubby below, 9-12 dm. high, hoary white throughout with a close tomentum; leaves oblong-lanceolate or the lowest ovate, obtuse; the upper with truncate base, very short-petioled; flowers in dense verticillate glomerules and interrupted spicate, much bracteate; bracts herbaceous oval, or oblong, obtuse and mucous; calyx splitting down anteriorly, at length emarginate posteriorly, its teeth obtuse and mucous; corolla light purple, about 1 cm. long, its tube scarcely exceeding

the calyx; stamens and style much exserted; connective almost continuous with the filament.

Occasional in the foothills of the Santa Monica and San Fernando Mountains. April-July.

3. *R. stachyoides* (Benth.) Briquet. (BLACK SAGE.) Cinereous-tomentose or glabrate, shrubby, 1 m. high or more, branching and leafy; leaves oblong-lanceolate, narrowed at base or short-petioled, crenate, green and rugose above, cinereous-tomentose beneath; flowers in interrupted spicate heads or whorls; the floral leaves much reduced, these and the ovate or oblong bracts as well as the calyx-teeth of the bilabiate calyx cuspidate-acuminate or spinulose-aristulate; corolla white or lilac-tinged, about 1 cm. long, the tube longer than the limb; style, and especially the stamens, little exserted; subulate appendages of the connective often manifest.

Common on the low hills throughout our range. April-June.

4. *R. polystachya* (Benth.) Greene. (WHITE SAGE.) Shrubby below, 1 m. high or more, minutely tomentose-canescens, the branches virgate; leaves mostly very white on both surfaces, oblong-lanceolate, minutely rugose and crenulate, 5-8 cm. long; inflorescence thyrsoid-paniculate, 3-6 dm. long; the floral leaves, bracts and bractlets small and loose, at length reflexed, lanceolate or subulate, cuspidate-tipped; flowers sessile, loose; upper lip of calyx truncate or 3-toothed, at length concave or galeate, longer than the triangular-subulate lower lip; corolla white or nearly so, the lower lip much enlarged, the middle lobe rounded, emarginate at apex, unguiculate, the upper lip short; tube very short; style and divergent stamens long-exserted; filiform connective continuous with the filament, its lower end usually indicated by a minute tooth.

Very common on the dry plains toward the foothills and ascending these to about 3000 feet. April-July.

7. SPHACELE Benth.

Shrubby or suffrutescent aromatic plants with the floral leaves gradually reduced with rather large flowers solitary in their axils, forming a leafy raceme. Calyx campanulate, deeply and nearly equally 5-toothed, membranous in fruit, naked within. Corolla with a broad tube, with a hairy ring at its base within, and 5 broad or roundish and plane, rather erect lobes. Stamens 4, distant, somewhat ascending; filaments naked; anther-sacs divergent.

1. *S. fragrans* Greene. Shrubby at base, 6-9 dm. high, copiously villous, the branches leafy; leaves ovate or oblong, obtuse at apex, truncate or hastate-subcordate at base, petioled, crenate, obtusely serrate or entire, rugose-veiny, 2.5-5 cm. long; the uppermost and bracts sessile; calyx-lobes attenuate-lanceolate from a rather narrow base, over 1 cm. long; corolla purplish, about 2.5 cm. long. (*S. calycina wallacei* Gray.)

Occasional in the mountains, mostly in the upper portions of the chaparral belt, on shaded slopes. May-June.

8. **MICROMERIA** Benth.

Erect branching or trailing perennial aromatic herbs, with small pedicelled flowers solitary in the axils of the leaves. Calyx oblong or tubular, about equally 5-toothed and 12-15-nerved. Corolla distinctly bilabiate, naked within, upper lip erect, entire or emarginate; the lower spreading, 3-parted. Stamens 4; filaments arcuate-ascending; the upper pair longer; anthers 2-celled.

1. *M. chamissonis* (Benth.) Greene. (YERBA BUENA.) Stems slender, trailing or creeping, 3 dm. long or more, herbage slightly pubescent; leaves round-ovate, crenate, glandular-punctate, 2.5 cm. long or less; petioles 4-6 mm. long; flowers about 8 mm. long; calyx minutely hispidulous; corolla pubescent without. (*M. douglasii* Benth.)

Santa Monica Mountains in shady places, not common. May-June.

9. **MONARDELLA** Benth.

Annual or perennial aromatic herbs, with flowers in terminal heads which are subtended by broad often more or less colored involucre bracts. Calyx tubular, narrow, 5-toothed, 15-nerved. Corolla glabrous within, the upper lip erect, 2-cleft, the lower 3-parted, all the lobes linear or narrowly oblong. Stamens 4, distinct, strongly or moderately unequal, exserted, straight; anthers often divergent or divaricate.

Perennials.

Leaves similar on both surfaces.

Herbage cinereous with short dense villous-like tomentum.

1. *M. cinerea*.

Herbage glaucous green or silvery with a minute puberulence.

2. *M. epilobioides*.

Leaves densely hoary tomentose beneath, glabrous and dark green above.

3. *M. hypoleuca*.

Annuals.

Bracts obtuse or acute.

4. *M. lanceolata*.

Bracts abruptly acuminate.

Calyx and bracts villous.

5. *M. pringlei*.

Calyx and bracts short-pubescent.

6. *M. elmeri*.

1. *M. cinerea* Abrams. Stem slightly woody at base, freely branching, branches spreading, 1 dm. or less in length, cinereous; leaves sessile, 5 to 8 mm. long, broadly ovate-triangular, obtuse at apex, abruptly rounded at base, denticulate, cinereous on both surfaces with soft villous tomentum, lateral veins in 2 pairs; floral pair of leaves similar, closely subtending heads; bracts broadly ovate, acute or obtuse, 8 mm. long, purple, faintly veined, sparsely

villous pubescent; heads 15 to 20 mm. broad, many flowered; calyx 7 mm. long, purple tinged, tube villous pubescent and glandular, teeth subulate, 2 mm. long, villous within; corolla tube not exerted, lobes 4 mm. long; lower stamens slightly exceeding lobes, a third longer than upper pair.

Known only from near the summit of Mt. San Antonio.

2. *M. epilobioides* *erecta* Abrams. Perennial from a woody rootstock, 1 to 2 dm. high; branches erect or decumbent, light green, with short retrorsely spreading pubescence of slender 2-celled hairs. Leaves oblong-linear, obtuse, entire, firm, only the midvein evident, bright glaucous green, appearing glabrous, but minutely and sparsely pubescent under a lens; heads 12 to 15 mm. broad; bracts ovate-lanceolate, 10 mm. or less in length, acute or short acuminate, membranaceous, green or faintly tinged with purple; calyx 6 mm. long, nearly glabrous except villous inner surface of teeth; corolla tube well exerted, 8 mm. long; stamens very unequal; filaments villous below the middle.

Open coniferous forests of the San Bernardino and San Antonio Mountains.

3. *M. hypoleuca* Gray. Stems tufted, woody at base, 3 to 5 dm. high, more or less tomentose; leaves ovate-oblong, 2 to 4 cm. long, obtuse, entire, slightly revolute, densely white tomentose beneath, glabrous and shiny above, veins evident, impressed on upper surface; bracts broadly ovate, obtuse, 1 cm. long, tomentose; calyx villous, its teeth triangular-subulate; corolla pale.

Coastal mountains of southern California from Santa Barbara to Orange county; Santa Monica Mountains.

4. *M. lanceolata* Gray. Stems more or less puberulent, usually simple below, 1 to 5 dm. high; leaves lanceolate-oblong, 25 to 40 mm. long, tapering into a slender petiole, green and glabrous or minutely puberulent; bracts ovate to ovate-lanceolate, acute, herbaceous or more or less tinged with purple, lateral veins usually prominent, sparsely and minutely scabrous, especially on veins; calyx-teeth triangular-subulate, villous within, sparsely pubescent without and more or less hispid with spreading hairs at sinuses; corolla rose-purple.

A common species on the sandy plains, and extending to the coniferous forests of the mountains. Very aromatic, and frequently called pennyroyal.

5. *M. pringlei* Gray. Stems erect, branching near base, puberulent; leaves lanceolate, 35 mm. long or less, puberulent, narrowed to a short petiole; bracts broadly ovate, abruptly acuminate, 8 to 10 mm. long, villous pubescent; calyx teeth narrowly triangular-subulate, villous pubescent without; corolla rose-purple.

Sandy plains of San Bernardino Valley near Colton.

6. *M. elmeri* Abrams. Stems erect, branching from the base, puberulent; leaves lanceolate to narrowly ovate, 25 mm. long or less, narrowed to a short petiole, somewhat cinereous with a fine puberulence; bracts broadly ovate, abruptly acuminate, 12 mm. long, sparsely scabrous, green below, becoming membranous above

and tinged with rose-purple, midvein dividing near base into about 8 parallel lateral veins; calyx 7 mm. long, sparsely short pubescent with spreading hairs, 15-nerved, teeth narrowly triangular-subulate, 2 mm. long, sparsely short pubescent without, villous within, herbaceous throughout or tinged with rose-purple; corolla rose-purple, slightly exceeding calyx, sparsely short pubescent, lobes 4 mm. long.

Known only from the vicinity of Acton.

10. **KOELLIA** Moench.

Perennial erect herbs with small flowers in terminal or sometimes also axillary capitate or cymose clusters. Calyx ovoid, oblong or tubular, equally or more or less unequally 5-toothed. Corolla 2-lipped, the upper lip emarginate or entire, the lower 3-cleft. Stamens 4, didynamous, nearly equal or the lower pair a little the longer; anther-sacs parallel. Ovary deeply 4-parted; style slender. Nutlets smooth, pubescent or roughened.

1. **K. californica** (Torr.) Kuntze. Aromatic, herbage whitish with a very fine and close soft pubescence; stem erect, simple or with a few terminal branches, 5-9 dm. high; leaves ovate to ovate-lanceolate, sessile by an obtuse or subcordate base, entire or denticulate, 3-9 cm. long; heads terminal and compact; calyx pubescent, the tips of the teeth very woolly exteriorly; corolla white, resin-dotted. (*Pycnanthemum californicum* Torr.)

Occasional in the canyons of all the mountains. April-July.

11. **LYCOPUS** L. WATER-HOARHOUND.

Herbs, perennial by slender stolons or suckers, with erect or diffuse stems, and small white or purple flowers, bracted and verticillate in dense axillary clusters. Calyx campanulate, regular or nearly so, 4-5-toothed, naked in the throat. Corolla funnelform-campanulate to cylindric, equaling or exceeding the calyx, the limb nearly equally 4-cleft, or 1 of the lobes broader and emarginate. Perfect stamens 2, anterior, the posterior pair rudimentary or wanting; anther-sacs parallel. Ovary deeply 4-parted; style slender, 2-cleft. Nutlets truncate at the summit, narrowed below, trigonous, smooth.

1. **L. lucidus** Turcx. Pubescent or glabrate, perennial by stolons; stem usually stout, erect, strict, leafy, simple or sometimes branched, 3-9 dm. high; leaves oblong-lanceolate, acute at the apex, narrowed or rounded at the base, sessile or nearly so, 5-15 cm. long, sharply serrate; bracts ovate or lanceolate, acuminate-subulate, the outer ones often as long as the flowers; calyx-teeth 5, subulate-lanceolate, nearly as long as the tube; corolla slightly exceeding the calyx;

rudimentary stamens slender, thickened at the apex; nutlets much shorter than the calyx.

Occasional along stream banks in the San Bernardino Valley, *Parish*.

12. MENTHA L.

Erect or diffuse aromatic herbs with simple mostly punctate leaves, and small whorled flowers, the whorls axillary or in terminal dense or interrupted spikes. Calyx campanulate to tubular, 10-nerved, regular or slightly bilabiate, 5-toothed. Corolla-tube shorter than the calyx, the limb 4-cleft, somewhat regular, the posterior lobe usually somewhat broader than the others, entire or emarginate. Stamens 4, equal, erect, included or exserted; filaments glabrous; anthers 2-celled, the sacs parallel. Ovary 4-parted; style 2-cleft. Nutlets ovoid, smooth.

1. *M. piperita* L. (PEPPERMINT.) Perennial by subterranean suckers; stems glabrous or sparsely puberulent, mostly erect, branched, 3–9 dm. high; leaves ovate-oblong to oblong-lanceolate, narrowed or rounded at the base, petioled, acute at the apex, sharply serrate, glabrous except the veins beneath; whorls of flowers in terminal dense or interrupted spikes, 2.5–7 cm. long in fruit; calyx tubular-campanulate, its teeth subulate, ciliate, half as long as the tube or more; corolla glabrous.

Occasional along streams about Los Angeles and Santa Ana. August–December.

2. *M. spicata* L. (SPEARMINT.) Perennial by leafy stolons; herbage glabrous; stems branched, 3–5 dm. high; leaves lanceolate, short-petioled or sessile; whorls of flowers in terminal narrow, acute, usually interrupted spikes, these becoming 5–10 cm. long in fruit; calyx campanulate, its teeth hirsute or glabrate, subulate, nearly as long as the tube; corolla glabrous. (*M. viridis* L.)

Frequent in low ground along streams. August–December.

Family 93. SOLANACEAE. POTATO FAMILY.

Herbs, shrubs, vines or rarely trees, with alternate or rarely opposite exstipulate leaves, and perfect regular or nearly regular cymose flowers. Calyx mostly 5-lobed. Corolla varying from rotate to salver-shaped, mostly 5-lobed, the lobes induplicate-valvate or plicate in the bud. Stamens as many as the lobes of the corolla and inserted on the tube alternate with them, equal (4 and didynamous in *Petunia*, the fifth being smaller or obso-

lete); anthers 2-celled apically or longitudinally dehiscent. Ovary entire, 3-5-celled, usually 2-celled; ovules numerous on the axillary placentæ; style slender, simple; stigma terminal. Fruit a berry or capsule.

Fruit a pulpy berry.

Anthers not connivent; fruiting-calyx inflated. 1. *PHYSALIS*.

Anthers connivent; calyx not becoming inflated. 2. *SOLANUM*.

Fruit a nearly dry berry; shrubby. 3. *LYCIUM*.

Fruit a capsule.

Capsule prickly; flowers large, showy. 4. *DATURA*.

Capsule not prickly.

Flowers paniculate or racemose. 5. *NICOTIANA*.

Flowers solitary. 6. *PETUNIA*.

1. *PHYSALIS* L. GROUND-CHERRY.

Annual or perennial herbs with entire or sinuately toothed leaves. Peduncles in ours solitary from the axils of the leaves. Calyx campanulate, 5-toothed, in fruit enlarged and bladdery-inflated, membranous, 5-angled or prominently 10-ribbed and reticulate, wholly inclosing the pulpy berry, its teeth mostly connivent. Corolla open-campanulate, or rarely nearly rotate, plicate in the bud. Stamens inserted near the base of the corolla; anthers oblong, opening by a longitudinal slit. Style slender; stigma minutely 2-cleft. Seeds numerous, reniform, finely pitted.

1. *P. ixocarpa* Brot. Annual, at first erect, later widely spreading, much branched; stem angled, glabrous or the young parts sparingly hairy; leaves cordate to ovate, with a cuneate somewhat oblique base, sinuately dentate or entire, 2.5-6 cm. long; peduncles 2-5 mm. long; calyx sparingly hairy, its lobes short, triangular; corolla bright yellow, with purple throat, 10-15 mm. broad; fruiting calyx round-ovoid, obscurely 10-angled; berry purple. (*P. aequata* Jacq. f.)

Frequent in cultivated fields. June-September.

2. *P. greenii* Rose. Annual, erect-spreading, the flexuose branches angular, 2-3 dm. long; herbage viscid-pubescent throughout; leaves ovate or rhombic, acutish, entire or with few shallow teeth, 2-3 cm. long, on slender petioles of about the same length; corolla greenish yellow, 12-15 mm. broad; fruiting calyx 10-15 mm. long, pendulous on the slender peduncle, which exceeds it in length. (*P. pedunculata* Greene.)

San Joaquin Hills, Orange County; Santa Margarita Ranch, San Diego County. First collected on Cedros Island. April-July.

2. SOLANUM L. NIGHTSHADE.

Herbs or shrubs, often stellate-pubescent. Flowers cymose, paniculate or racemose, white, blue, purple or yellow. Calyx campanulate or rotate, mostly 5-toothed or 5-cleft. Corolla rotate, the limb plaited in the bud, 5-angled or 5-lobed. Stamens inserted on the throat of the corolla; filaments short; anthers linear or oblong, acute or acuminate, connate or connivent into a cone; the anther-sacs dehiscent by a terminal pore or by a short introrse terminal slit, or longitudinally. Ovary usually 2-celled; stigma small. Fruit a several-seeded berry.

Prickles none; flowers not yellow.

Corolla 5-cleft; peduncles longer than the pedicels.

Annual, villous and viscid; fruit yellow.

1. *S. villosum*.

Perennial, puberulent; fruit black.

2. *S. douglasii*.

Corolla 5-toothed; peduncles shorter than the pedicels.

Leaves entire; stems glabrate or viscid-pubescent.

3. *S. xanti*.

Leaves crenate; stems long-hirsute.

4. *S. wallacei*.

Prickles long and straight; flowers yellow.

5. *S. rostratum*.

1. *S. villosum* Lam. Rather low and mostly spreading annual, villous and more or less viscid; leaves conspicuously angulate-dentate; filaments somewhat pubescent; berries yellow.

Occasional in waste places. Soldier's Home.

2. *S. douglasii* Dunal. Usually somewhat woody, 1-2 m. high; stems angular, the angles somewhat denticulate-scabrous, otherwise more or less puberulent; leaves variously angular-dentate, or some nearly entire; umbels nearly opposite the leaves, several-flowered; flowers white or pale purplish, 8-14 mm. broad, pubescent without, deeply 5-parted, the lobes lanceolate; anthers yellow, 4-5 mm. long; filaments about 1 mm. long, stout, hairy, nearly equaling the slender style; fruit black.

A common native plant both in the valleys and mountains at lower altitudes. Often appearing as an introduced plant along roadsides and in waste places.

3. *S. xanti* Gray. Stems woody, 3-10 dm. high, the younger angled, moderately villous with many-celled unbranched, mostly gland-tipped hairs; leaves ovate, ovate-oblong to oblong-lanceolate, the largest 4-6 cm. long, acute or obtuse at the base, the margins entire; corolla 1-2 cm. broad, usually deep violet, angulately 5-lobed; berry greenish.

Common in all the hills and mountains.

3a. *S. xanti glabrescens* (Torr.) Parish. Stems woody, slender, 10-15 dm. high, glabrate or above hirsutulous with short, mostly

1-celled hairs; leaves oblong, elliptic or lanceolate, mostly attenuate or acute at the base, 2-6 cm. long; corolla 2 cm. broad.

Occasional in the valleys and foothills, mostly in dry and rather exposed places.

4. *S. wallacei* (Gray) Parish. Stems woody, about 1 m. high, densely tawny with long many-celled glandular, mostly simple hairs; leaves thickish, usually smoother than the stems, crenate, the lower ample, cordate, the upper ovate, rounded or subcordate at base; calyx narrowly funnelform, deeply cleft or less so and broader; corolla 2-4 cm. broad, deep violet; style glabrate or villous below; fruit dark purple.

Santa Catalina Island.

5. *S. rostratum* Dunal. Annual, erect, branching, 1-3 dm. high, pubescent with long yellowish stellate hairs and armed with long straight prickles; leaves pinnatifid; calyx densely prickly, its lobes narrow, nearly half the length of the corolla and enclosing the fruit; corolla about 2 cm. broad, yellow; anthers linear-lanceolate, the lowest much longer and larger, with an incurved beak.

Occasional in waste places and along roadsides. Inglewood; Soldiers Home; Santa Monica. Native of Texas.

3. LYCIUM L. BOX-THORN.

Shrubby, often spiny plants, with small alternate entire leaves, and white greenish or purple, axillary or terminal solitary or clustered flowers. Calyx campanulate, 3-5-lobed or 3-5-toothed, not enlarged in fruit, persistent at the base of the berry. Corolla funnelform, salver-shaped or campanulate, the limb 5-lobed, the lobes obtuse. Stamens 5; filaments filiform, sometimes dilated at the base; anther-sacs longitudinally dehiscent. Ovary 2-celled; style filiform; stigma capitate or 2-lobed. Berry globose to oblong.

Calyx-lobes lanceolate, exceeding the tube.

1. *L. richii*.

Calyx-lobes oblong or triangular, shorter than the tube.

Corolla-tube short, not exceeding the calyx.

2. *L. californicum*.

Corolla-tube about 3 times the length of the calyx.

3. *L. parishii*.

1. *L. richii* Gray. Stem slender; leaves narrowly spatulate, 2-4 cm. long; flowers short-pedicelled, 8-10 mm. long; calyx-teeth lanceolate, nearly or quite equaling the corolla-tube; corolla-lobes oval, slightly exceeding the tube.

A Mexican species reported from Santa Catalina Island.

2. *L. californicum* Nutt. Glabrous; stems slender, much branched, about 6-12 dm. high; leaves thickish, 2-6 mm. long, obovate or spatulate to nearly linear; pedicels often nearly obso-

lete; corolla white, its tube about 3 mm. long, included in the campanulate 4-toothed calyx, its limb rotate, 4-parted, scarcely 4 mm. broad.

On bluffs near the sea. Redondo; Long Beach; Laguna. First collected by Nuttall at San Diego.

3. *L. parishii* Gray. Puberulent, branches slender; leaves spatulate and lanceolate, about 6 mm. long; pedicels 4–6 mm. long; calyx about 3 mm. long, its limb shortly 5-lobed; corolla narrowly funnelform, about 10 mm. long, its lobes 2 mm. long, ovate, obtuse, at length equaled by the stamens.

Dry mesas in the San Bernardino Valley, *Parish*; Elsinore, *Baker*.

4. *DATURA* L. THORN-APPLE.

Annual or perennial erect branching narcotic herbs, with alternate petioled entire or sinuate-dentate leaves, and large showy solitary short-peduncled flowers. Calyx elongated-tubular or prismatic, 5-cleft or spathe-like, circumscissile near the base. Corolla funnelform, the limb plaited, 5-lobed, the lobes broad, acuminate. Stamens inserted at or below the middle of the corolla; filaments filiform, elongated. Ovary 2-celled or falsely 4-celled; style filiform; stigma slightly 2-lobed. Capsule 4-valved from the top or bursting irregularly, ovoid or globose, prickly.

1. *D. stramonium* L. (STRAMONIUM OR JAMESTOWN-WEED.) Annual, green, glabrous, 3–10 dm. high; leaves sinuately and laciniately angled and toothed; calyx prismatic; corolla white, about 8 cm. long; capsule erect, thickly armed with short stout prickles.

Introduced at Playa del Rey, *Davidson*.

2. *D. metelioides* DC. Prunose-glaucous, erect, branching, 6–10 dm. high from a perennial root; leaves unequally ovate, more or less coarsely repandodentate or nearly entire; calyx cylindric, about 8 cm. long; corolla white or tinged with violet, 15–20 cm. long, the limb about 10 cm. broad, with 5 slender subulate teeth; capsule drooping in fruit, 5 cm. in diameter, densely prickly.

Frequent in sandy soil throughout our range. July–September.

5. *NICOTIANA* L. TOBACCO.

Annual or perennial viscid-pubescent or rarely glabrous narcotic herbs, shrubs or small trees, with alternate entire or slightly undulate leaves, and medium-sized often yellowish or greenish flowers, in terminal often bracted racemes or panicles. Calyx tubular-campanulate or ovoid, 5-cleft. Corolla funnelform, salver-shaped or nearly tubular, the tube usually elongated, the limb

5-lobed, spreading. Stamens 5, inserted on the tube of the corolla; filaments filiform; anthers 4-celled; style slender; stigma capitate. Capsule 2-valved or sometimes 4-valved at the summit, smooth. Seeds numerous, small.

Annual herbs.

Calyx-teeth fully twice the length of the tube. 1. *N. clevelandi*.

Calyx-teeth about equalling the tube. 2. *N. bigelovii*.

Tree.

3. *N. glauca*.

1. *N. clevelandi* Gray. Viscid-pubescent or the stem villous, 2-6 dm. high; leaves ovate or the upper ovate-lanceolate, 5-8 cm. long, the lower obtuse and with margined petiole not dilated at base, the upper sessile and gradually narrowing from a broad and rounded or truncate base into an acuminate apex; bracts lanceolate; flowers paniculate-racemose; calyx-lobes linear, unequal; the longer fully twice the length of the tube, more than half the length of the corolla; corolla greenish-white, tinged with violet, almost glabrous, 2.5 cm. long, salver-shaped, the somewhat 5-lobed limb 1 cm. broad; filaments slender, equally inserted low down on the tube of the corolla.

Sand-dunes along the seashore near Playa del Ray.

2. *N. bigelovii* Wats. Viscid-pubescent; stems 3-6 dm. high; leaves oblong-lanceolate, sessile or nearly so, the lower 12-18 cm. long, with tapering base, the upper 4-8 cm. long, more acuminate, with acute or some with broader and clasping base; inflorescence loosely racemiform; the upper flowers bractless; calyx-teeth unequal, linear-subulate, about equaling the tube; corolla white, its tube 3-5 cm. long, narrow, with a gradually expanded throat, the limb 5-angulate-lobed, 15-25 mm. broad; filaments somewhat unequally inserted high up on the corolla-tube.

Occasional in dry washes about Los Angeles.

3. *N. glauca* Graham. Arborescent, 3-6 m. high, glaucous and glabrous; leaves long-petioled, ovate, subcordate; flowers loosely paniculate; corolla greenish-yellow, 3-5 cm. long, tubular, contracted at the throat, its limb erect, 5-crenate.

A well-established introduced plant; rather common along streams. Flowering all the year.

6. PETUNIA Juss. PETUNIA.

Viscid-pubescent annual or perennial branching herbs, with entire leaves and axillary or terminal solitary flowers. Calyx deeply 5-cleft or 5-parted, the segments narrow. Corolla funnelform or salver-shaped, its limb plicate spreading, slightly irregular. Stamens 5, inserted on the throat of the corolla, 4 of them didynamous, perfect, the fifth smaller, obsolete; filaments slender. Ovary 2-celled; style filiform; stigma 2-lamellate. Capsule 2-celled, 2-valved.

1. *P. parviflora* (Lehm.) Juss. Small, prostrate or diffusely spreading, more or less pubescent, annual; leaves oblong-linear or spatulate, rather fleshy, nearly sessile, 12 cm. long or less; peduncles very short; calyx-lobes resembling the smaller leaves; corolla purple, the tube pale or yellowish, 8 mm. long, funnelform, its lobes short, retuse, slightly unequal; capsule small, ovoid.

Occasional on margins of ponds and along streams, especially in subsaline places. June–August.

Family 94. SCROPHULARIACEAE. FIGWORT FAMILY.

Herbs or shrubs with opposite or alternate exstipulate leaves and perfect irregular flowers. Calyx persistent, 4–5-toothed or 4–5-divided. Corolla 2-lipped or nearly regular. Stamens 2, 4 or 5, didynamous or nearly equal, inserted on the corolla and alternate with its lobes; anthers 2-celled or confluent 1-celled, longitudinally dehiscent. Ovary superior, 2-celled or rarely 1-celled; ovules mostly numerous, borne on the axillary placentæ; style simple; stigma entire or 2-lobed. Fruit mostly capsular and septicidally or loculicidally dehiscent. Seeds often reticulated or striate.

Fertile stamens 5.

1. VERBASCUM.

Fertile stamens 2 or 4.

Leaves opposite or the uppermost sometimes alternate.

Corolla spurred or saccate at base.

Corolla-tube with a spur at base.

2. LINARIA.

Corolla-tube with a sac at base.

3. ANTIRRHINUM.

Corolla without a sac or spur at base.

Fertile stamens 4.

Fifth stamen represented by a filament, scale or gland.

Sterile stamen represented by a filament or scale.

Sterile stamen a scale adnate to the upper side of the corolla.

4. SCROPHULARIA.

Sterile stamen represented by a sterile filament.

5. PENTSTEMON.

Sterile stamen reduced to a gland at the base of the corolla.

6. COLLINSIA.

Fifth stamen wholly wanting.

Shrubs; capsule dehiscing down one side.

7. DIPLACUS.

- | | |
|---|--------------------------|
| Herbs; capsule dehiscing at the apex. | 8. <i>MIMULUS</i> . |
| Fertile stamens 2. | |
| Sterile stamens 2. | 9. <i>MIMETANTHE</i> . |
| Sterile stamens none. | 10. <i>VERONICA</i> . |
| Leaves alternate. | |
| Leaves not pinnately divided. | |
| Sepals united into a toothed or deeply cleft calyx. | |
| Calyx 2-cleft. | 11. <i>CASTILLEIA</i> . |
| Calyx 4-cleft. | 12. <i>ORTHOCARPUS</i> . |
| Sepals of 2 bract-like divisions or the anterior division absent. | 13. <i>ADENOSTEGIA</i> . |
| Leaves pinnately divided; calyx 2-5-toothed. | 14. <i>PEDICULARIS</i> . |

1. *VERBASCUM* L. MULLEIN.

Biennial or rarely perennial, mostly tall and erect herbs, with alternate leaves and rather large showy flowers in terminal spikes, racemes or panicles. Calyx 5-parted. Corolla rotate, 5-lobed, the lobes slightly unequal. Stamens 5, inserted on the base of the corolla, unequal; filaments of the 3 upper or of all pilose; anthers confluent into 1. Ovules numerous; styles dilated and flattened at the summit. Capsule globose to oblong, septicidally 2-valved; the valves usually 2-cleft at the apex. Seeds numerous, rugose.

1. *V. virgatum* With. Stems about 1 m. high, stout, pubescent and glandular throughout; lowest leaves 1-2 dm. long, oblong-ovate or oblong-lanceolate, crenate, the upper similar but smaller and decurrent on the stems; raceme narrow, spike-like, 5 dm. long or more; flowers somewhat clustered or solitary in the axils of the much reduced bract-like leaves, nearly sessile or short-pedicelled; calyx ovate, 5-6 mm. long; corolla yellow, about 15 mm. broad; filaments all bearded with violet woolly hairs; capsule subglobose, about 6 mm. in diameter.

Frequent along roadsides and in waste places, especially in the interior valleys. San Gabriel; El Monte; Lordsburg; Pomona. May-August.

2. *LINARIA* Juss.

Herbs with alternate leaves or the lower opposite or verticillate, and regular flowers in terminal bracted racemes or spikes. Calyx 5-parted, the segments imbricated. Corolla spurred at the base or the spur rarely obsolete, 2-lipped, the upper lip erect, 2-lobed, the lower

spreading, 3-lobed, its base produced into a palate often nearly closing the throat. Stamens 4, didynamous, ascending, included; filaments and style filiform. Capsule ovoid or globose, opening by usually 3-toothed pores or slits below the summit. Seeds numerous, rugose, angled or sometimes winged.

1. *L. canadensis* (L.) Dumont. (WILD TOAD-FLAX.) Biennial or annual, glabrous; flowering stem erect or ascending, very slender, simple or branched, 2-7 dm. high, the sterile shoots spreading or procumbent, leafy; leaves linear or linear-oblong, 1-5 cm. long, entire, sessile; flowers 6-8 mm. long in slender long racemes; pedicels 4-6 mm. long, erect and appressed in fruit, minutely bracted at the base; calyx-lobes lanceolate, about equaling the capsule; spur of the corolla filiform, curved, as long as the tube or longer; palate white, corolla otherwise blue.

Occasional in cultivated fields, especially in sandy soil.

3. *ANTIRRHINUM* L. SNAP-DRAGON.

Annual or perennial herbs, with alternate leaves or the lower opposite, and mostly rather large flowers in terminal racemes or solitary in the upper axils. Calyx 5-parted. Corolla irregular, gibbous or saccate at the base, 2-lipped, the upper lip erect, 2-lobed, the lower spreading, 3-lobed, its base produced into a palate nearly or quite closing the throat. Stamens 4, didynamous, included; filaments filiform or dilated above. Style filiform. Capsule obovoid or globose, opening by chinks or pores below the summit. Seeds numerous.

Herbs with all but the lowest leaves alternate.

Herbage glandular-villous or glandular-pubescent throughout.

Flowers short-pedicelled or sessile, without prehensile branchlets.

Flowers on slender pedicels usually longer than the flowers, with prehensile branchlets.

Leaves nearly all distinctly petioled.

Leaves all sessile or nearly so.

Herbage not glandular-villous or glandular-pubescent throughout.

Pedicels shorter than the calyx.

Pedicels slender, much elongated and tortile.

Shrub with opposite or verticillate leaves.

1. *A. glandulosum*.

2. *A. nuttallianum*.

3. *A. subsessile*.

4. *A. coulterianum*.

5. *A. strictum*.

6. *A. speciosum*.

1. *A. glandulosum* Lindl. Stems stout, erect, 1-1.5 m. high, glandular-pubescent and viscid throughout, destitute of prehensile

branches, leafy; leaves lanceolate, mostly sessile above, gradually passing into bracts of the leafy dense spike or raceme; sepals oblong-lanceolate, unequal, the longer equaling the capsule; corolla rose-colored; filaments somewhat dilated above.

Occasional in the San Gabriel Mountains in the chaparral belt.

2. *A. nuttallianum* Benth. Stems branched from the base, the branches mostly procumbent, 5-10 dm. long, glandular-pubescent throughout; leaves ovate or subcordate, the largest about 2.5 cm. long, nearly all distinctly petioled; peduncles, at least the lowest ones, longer than the flowers, sometimes disposed to be tortile; sepals shorter than the tube of the violet corolla; corolla about 8 mm. long, the lobes nearly equal; palate very prominent; seeds almost alately costate.

Occasional in sandy soil, especially toward the coast.

3. *A. subsessile* Gray. Similar to the preceding but less diffuse and erect, strongly glandular-pilose; leaves ovate, all sessile or nearly so; pedicels shorter than the somewhat larger flowers; lower lip of the corolla larger in proportion.

Reported from Santa Catalina Island. Rather frequent on the mainland about San Diego.

4. *A. coulterianum* Benth. Stem 5-10 dm. high, erect, or gaining support by its filiform tortile branches acting as tendrils, glabrous, except the inflorescence which is villous-pubescent with viscid and often glandular hairs; leaves distant, linear to oval; spike virgate, 5-20 cm. long; pedicels shorter than the calyx; sepals linear or lanceolate, obtuse, all shorter than the oval or ovate-oblong glandular-pubescent capsule; corolla violet-purple or usually white with yellowish palate, the lower lip large, the tube about 6 mm. long.

Frequent in the lower portions of the chaparral belt and on the fans at the base of the mountains.

5. *A. strictum* (H. & A.) Gray. Erect, nearly simple, 3-6 dm. high, the tortile branches none; lowest leaves ovate-lanceolate, the upper ones linear or the floral filiform, much shorter than the tortile racemose peduncles; corolla violet-purple, about 1 cm. long, with hairy palate and gibbous base; capsule crustaceous, globose, strongly exceeding the calyx, tipped with the straight style of equal length.

Occasional at lower altitudes in the mountains and foothills.

6. *A. speciosum* (Nutt.) Gray. A much branched shrub, 1 m. high; leaves opposite or verticillate, oval or oblong, 2-4 cm. long, persistent; corolla scarlet, about 2 cm. long, the lobes short, about one-third the length of the tube, palate prominent but not closing the throat. (*Gambelia speciosum* Nutt.)

An insular species, found on Santa Catalina Island, and probably generically distinct.

4. SCROPHULARIA L. FIGWORT.

Perennial strong-smelling herbs, with mostly opposite large leaves, and small flowers in terminal panicked cymes

or thyrses. Calyx 5-parted, the lobes mostly obtuse. Corolla irregular, the tube globose or oblong, not gibbous or spurred at the base, the limb 5-lobed, the 2 upper lobes longer, erect, the lateral ones ascending, the lower spreading or reflexed. Stamens 5, 4 of them anther-bearing, didynamous, declined, the fifth sterile and reduced to a scale on the roof of the corolla-tube; anther-sacs confluent into 1. Style filiform; stigma capitate or truncate. Capsule ovoid, septicidally dehiscent. Seeds rugose.

1. *S. californica* Cham. Stems erect, 1-2 m. high, glabrous below, above finely glandular-pubescent; leaves ovate, cordate at base, serrate or incised-serrate, 6-18 cm. long; flowers about 8 mm. long; corolla dull red.

Frequent in the foothills and mountains below the pine belt. March-June.

5. *PENTSTEMON* Soland.

Perennial herbs or suffrutescent plants, with opposite or rarely verticillate leaves, and large showy flowers in terminal racemes, panicles or cymes. Calyx 5-parted. Corolla irregular, tubular and often inflated, the limb 2-lipped, the upper lip 2-lobed, the lower lip 3-lobed. Stamens 5, included, 4 antheriferous and didynamous, the fifth sterile, as long or shorter than the others; anther-sacs divergent or connivent. Style filiform; stigma capitate. Capsule septicidally dehiscent. Seeds numerous, mostly angled.

Anther cells dehiscent for their whole length or nearly so.

Flowers red or purple.

Corolla-tube not dilated.

Woody half climbers; leaves toothed.

Leaves subcordate or ovate.

Leaves linear-lanceolate.

1. *P. cordifolius*.

2. *P. ternatus*.

Herbaceous erect perennials; leaves entire.

Flowers in a simple raceme.

Flowers in a narrow panicle.

3. *P. labrosus*.

4. *P. centranthifolius*.

Corolla-tube dilated.

Herbage glabrous throughout; sterile filament glabrous.

Upper leaves connate.

Upper leaves not connate.

5. *P. spectabilis*.

6. *P. parishii*.

Herbage glabrous except the glandular or primose-puberulent inflorescence; sterile filament bearded.

7. *P. palmeri*.

Flowers yellow; shrub.

Anther cells horseshoe-shaped, remaining closed below and saccate.

8. *P. antirrhinoides*.

9. *P. heterophyllus*.

1. *P. cordifolius* Benth. Somewhat scandent over shrubs by long sarmentose branches, very leafy, scabrous-puberulent and the inflorescence somewhat glandular; leaves subcordate or ovate with truncate base, acutely serrate or dentate, 2.5 cm. long or less; thyrsus short and leafy; peduncles several-flowered; sepals ovate-lanceolate; corolla scarlet, the tube about 2.5 cm. long, the lips about 15 mm. long, the upper lip erect, the lower more or less spreading; sterile filament bearded down one side; anthers dehiscent through the apex.

Common in the chaparral belt of all the mountains. April-July.

2. *P. ternatus* Torr. Glabrous and the long virgate flowering branches glaucous, 1-2 m. high; leaves linear-lanceolate, rigid, 15-35 mm. long, acutely serrate or denticulate with salient teeth, the upper ternately verticillate; flowers in a long racemiform thyrsus; sepals ovate-acuminate; corolla pale scarlet, 2.5 cm. long, the lobes about 6 mm. long; stamens as in the last.

Occasional in the San Gabriel, San Bernardino and Santa Ana Mountains. May-August.

3. *P. labrosus* Hook. f. Glabrous; stems herbaceous, slender, erect, simple, 4-5 dm. high; leaves all entire, the lowest oblanceolate, 5-6 cm. long, about 1 cm. broad, the upper linear-lanceolate, reduced; bracts minute; flowers in a simple raceme; pedicels 1-2 cm. long; calyx-lobes ovate, acuminate, 4 mm. long; corolla scarlet, 2.5-3 mm. long, destitute of beard; tube narrow; upper lip erect, the 3 lobes of the lower one equaling the upper one in length, reflexed, about two-thirds the length of the tube; sterile filament glabrous; anthers closed toward the apex.

Frequent in the San Gabriel and San Bernardino Mountains in open places among the pines. June-August.

4. *P. centranthifolius* Benth. Glaucous, strict and virgate, 4-8 dm. high; leaves all entire, the lower lanceolate, the upper clasping, ovate-lanceolate; panicle narrow, usually 3 dm. long or more; pedicels slender; corolla deep scarlet, narrow, tubular and obscurely bilabiate; the short oblong lobes alike, except that the posterior are united higher; anthers opening widely, splitting through the apex.

Common in the foothills and mountains mostly below the pine belt throughout our range. April-July.

5. *P. spectabilis* Thurber. Pale or glaucescent and glabrous throughout, 6-12 dm. high; leaves thinnish-coriaceous, ovate or ovate-lanceolate or the lower oblong, acute, the upper pairs acuminate and their broad bases connate-perfoliate, spinulosely dentate or denticulate; thyrsus many-flowered, elongated pyramidal or sometimes virgate, 3-6 dm. long; peduncles and pedicels slender; corolla rose-purple or lilac with the ample limb blue, 2.5 cm. long;

the narrow proper tube twice the length of the short ovate calyxlobes, then abruptly dilated into the campanulate-ventricose or broadly funnelform throat, somewhat bilabiate, the oval or roundish lobes 6-8 mm. long; sterile filament glabrous; anthers dehiscent from the base toward but not to the apex.

Frequent on dry hillsides. May-July.

6. *P. parishii* Gray. Size and habit of the last; leaves entire or minutely denticulate; upper clasping by subcordate base but not connate; corolla red, more dilated.

Not known within our limits. Cucamonga; San Bernardino.

7. *P. palmeri* Gray. Stems 6-9 dm. high; glabrous except inflorescence, that glandular or primose-puberulent; leaves coriaceous, glaucous, ovate or oblong-lanceolate, from sharply dentate to nearly entire, upper from closely sessile to completely connate-perfoliate; thyrsus elongated pyramidal, racemiform; corolla cream-white, suffused with pink; the short narrow proper tube hardly surpassing the ovate appressed sepals, very abruptly dilated into the ventricose-campanulate throat, about 2 cm. long and as broad at orifice; the lips broad, the upper erect, 2-lobed, lower 3-lobed, widely spreading, sparingly bearded at base; sterile filament densely bearded above with long yellowish hairs.

Occasional above 5000 feet in the San Gabriel and San Bernardino Mountains.

8. *P. antirrhinoides* Benth. Shrub often 2 m. high; leaves about 1 cm. long, spatulate or oval, entire; panicle leafy; flowers on short pedicels; sepals broadly ovate; corolla yellow, ventricose, 15-20 mm. long; sterile filament densely bearded on one side.

A common shrub along the eastern base of the Santa Ana Mountains, and extending eastward to the western slope of the San Jacinto Mountains; entering within our limits in Santiago Canyon, Santa Ana Mountains, *Geis, Perkins*.

9. *P. heterophyllus* Lindl. Green, seldom glaucescent, glabrous throughout or rarely primose-puberulent; stems or branches slender, 6-15 dm. high, from a woody base; leaves lanceolate or linear or the lower oblong-lanceolate, mostly narrowed at base; thyrsus virgate, loose, usually elongated; sepals ovate; corolla 2.5 cm. long or more, the narrow tube rose-colored or pink, sometimes changing to violet, ventricose funnelform; the bud often yellowish; sterile filament glabrous.

Occasional in the chaparral belt. Santa Monica Mountains; Verdugo Hills; Santa Anita Canyon.

6. COLLINSIA Nutt.

Annuals with simple verticillate or opposite leaves, and irregular flowers in whorls forming racemes, or solitary in the axils. Calyx campanulate, 5-cleft. Corolla declined, the proper tube very short, the abruptly expanded and gibbous throat forming an angle with it,

deeply bilabiate, the upper lip erect, 2-cleft; the lower lip larger, 3-lobed, the lateral lobes spreading or drooping, flat, the middle one conduplicate, keel-like, enclosing the 4 declined stamens and the filiform style. Stamens didynamous; filaments filiform; anther-sacs confluent at the apex. The fifth stamen represented by a gland on the upper side of the corolla-tube near the base. Stigma small, capitate or 2-lobed. Capsule ovoid or globose, septicidally 2-valved, the valves 2-cleft. Seeds few, large, peltate, concave on the inner side.

Flowers verticillate, showy; upper pair of filaments bearded at base.

Calyx-lobes mostly lanceolate, acute.

1. *C. bicolor*.

Calyx-lobes mostly linear, obtuse.

2. *C. tinctoria*.

Flowers usually scattered; filaments glabrous.

Stems puberulent.

3. *C. parryi*.

Stems glabrous.

4. *C. callosa*.

1. *C. bicolor* Benth. Simple or branched above, 1.5–4 dm. high, glabrous or finely pubescent and often viscid above; leaves broadly oblong or the upper narrowed from the broad base to the apex, serrulate, 5 cm. long or less; flowers crowded in whorl-like clusters, the lowest subtended by leaves, the others by bracts; pedicels shorter than the oblong or lanceolate calyx-lobes; corolla about 2 cm. long; the lower lip usually rose-purple; the upper lilac or white, its lobes nearly as long as those of the lower; throat saccate, bristly within; gland conic.

Common in open places in the hills and mountains, mostly below 2000 feet altitude. April–May.

2. *C. tinctoria* Hartweg. Resembling slender forms of the preceding in habit; herbage nearly or quite glabrous below, strongly viscid above and giving off a brownish stain; calyx-lobes linear or oblong-linear, obtuse; corolla pale purplish or nearly white and streaked with purple, 12–15 mm. long, the lobes of the upper lip very short, reflexed.

Frequent on shady slopes in the upper portions of the chaparral belt of the San Gabriel Mountains. April–June.

3. *C. parryi* Gray. Stems puberulent throughout, simple or more or less branched, 1.5–2.5 dm. high; leaves thinnish, the lower oblong, crenate, petioled, the upper lanceolate-linear, obtuse, mostly entire and closely sessile, 2–4 cm. long; pedicels solitary or the upper in 2's or 3's, as long as or the lowest exceeding the flowers; calyx-lobes oblong, obtuse; corolla deep blue, 6–8 mm. long, twice the length of the calyx, the lips about equal in length, not longer than the throat; capsule about equaling the calyx.

Occasional in dry ground in the chaparral belt. Verdugo Hills.

4. *C. callosa* Parish. Stems dichotomously branched, 10–30 cm. high, glabrous except the slightly glandular pedicels and calyces;

leaves opposite or ternate, oblong to acutely ovate, 2 cm. long or less, the upper much reduced, sessile, entire, rather thick, the margins somewhat revolute; calyx-lobes broadly lanceolate, acute; corolla light blue, 5-8 mm. long; the lips about equaling the moderately gibbous throat, their lobes entire, equal in length; capsule globose, shorter than the calyx-lobes.

First collected in Swartout Canyon, San Antonio Mountains, Hall; Mt. Gleason, Elmer.

7. *DIPLACUS* Nutt.

Low evergreen glutinous shrubs, with opposite leaves which are revolute in the bud, and large red, orange or salmon-colored flowers, solitary in the axils. Calyx tubular, 5-angled and 5-toothed. Corolla with funnel-form tube and rather broad bilabiate limb. Stamens 4. Stigma of 2 flat lobes closing together when irritated. Capsule firm, coriaceous, opening down the upper suture only, the valves spreading out nearly flat.

1. *D. longiflorus* Nutt. Low, suffrutescent, 5-10 dm. high, more or less branched throughout, viscid-pubescent or the inflorescence and growing parts villous and somewhat glandular; leaves narrowly or broadly lanceolate, more or less acute, 3-7 cm. long, rather thin, the margins often revolute, denticulate or dentate; calyx about 2.5 cm. long and about 8 mm. broad; the lobes 5-7 mm. long, the upper a little longer, villous with viscid hairs; corolla about 5 cm. long; the lobes of the upper lip shallowly 2-lobed, their margins wavy or erose; those of the lower lip usually truncate, more or less deeply crenately toothed.

Common on all the foothills and in the chaparral belt of the mountains. We have seen no specimens with the strongly arachnoid pubescence which is found on the plants about Santa Barbara, the type locality of this species. Two quite different forms occur with us: the one from which the above description is drawn occurs in the Santa Monica Mountains, and is nearest the type; but about Los Angeles and Pasadena the plants are usually less villous and have a slender (about 5 mm. broad) calyx, and narrower corolla-throat which tapers gradually to the slender tube.

2. *D. puniceus* Nutt. Resembling the last in habit; leaves usually narrowly lanceolate, the margins strongly revolute; calyx 15-20 mm. long, 5 mm. broad, viscid, not at all woolly, its lobes 4-5 mm. long; corolla 2-2.5 cm. long, scarlet, the lobes of the lower lips rather narrow, emarginate or retuse.

Common on dry hillsides about San Diego and ranging northward to the Santa Margarita River, where it seems to intergrade with *D. longiflorus*.

8. *MIMULUS* L. MONKEY-FLOWER.

Herbs with opposite leaves and mostly showy yellow or red flowers solitary and axillary or in a terminal

raceme. Calyx prismatic, 5-angled and 5-toothed. Corolla from tubular to funnellform with strongly bilabiate limb or the lobes nearly equal, a pair of bearded ridges extending down the lower side of the throat. Stamens 4, the fifth entirely wanting. Stigma mostly of 2 flat lobes closing together when irritated. Capsule dehiscent by both sutures or on one side only, or cartilaginous and indehiscent. Seeds many.

Flowers sessile or nearly so; styles pubescent or glandular.

Flowers red.

Calyx-lobes acutely subulate, nearly equaling the tube.

1. *M. bigelovii*.

Calyx-lobes broadly ovate or triangular, scarcely one-fourth the length of the tube.

2. *M. fremonti*.

3. *M. brevipes*.

Flowers yellow.

Flowers on slender pedicels; styles glabrous.

Herbage viscid-villous.

Flowers scarlet.

4. *M. cardinalis*.

Flowers yellow; herbage clammy.

Calyx 10-12 mm. long in fruit.

Corolla twice the length of the calyx.

5. *M. moschatus*.

Corolla little exceeding the calyx.

6. *M. parishii*.

Calyx 5-6 mm. long in fruit.

7. *M. floribundus*.

Herbage not viscid-villous.

Perennial from stoloniferous or creeping basal branches.

8. *M. langsдорffii*.

Annuals.

Upper calyx-lobe twice the length of the others.

9. *M. nasutus*.

Upper calyx-lobe little exceeding the others.

10. *M. microphyllus*.

1. *M. bigelovii* Gray. Low annual branching from the base, glandular pubescent; leaves oblong, the upper ovate, acute or acuminate; calyx-teeth nearly equal, very acutely subulate from a broad campanulate tube; corolla about 1.5 cm. long, the limb rotate, crimson with yellow center; the throat cylindraceous; capsule oblong-lanceolate, slightly exceeding the calyx, valves membranaceous.

Occasional in the pine belt of the San Gabriel Mountains. June-August.

2. *M. fremonti* (Benth.) Gray. Leaves narrowly oblong or the lowest spatulate, obtuse; calyx-teeth ovate, obtuse or acutish, less than a quarter the length of the tube; corolla crimson; otherwise as in the last.

Frequent in sandy places in the interior valleys. April-May.

3. *M. brevipes* Benth. Stem simple or branched, 3–6 dm. high, very viscid-pubescent; leaves lanceolate to linear, 3–10 cm. long, entire or commonly denticulate; calyx-teeth very unequal, acuminate, the posterior fully half the length of the broadly campanulate tube; corolla yellow, 2.5–4 cm. long, the expanded limb nearly as broad, campanulate, with ample rounded lobes; capsule ovate-acuminate, firm-coriaceous.

Common on the dry plains and in the foothills. March–June.

4. *M. cardinalis* Dougl. Perennial, 8 dm. high; branched from the base, with ascending branches, viscid-pubescent; leaves elliptic-ovate, 5 cm. long or more, dentate, sessile; pedicels longer than the flowers; calyx with equal triangular teeth; corolla scarlet, 3–5 cm. long, the throat yellowish with crimson lines, the tube little exerted, upper lip erect, deeply 2-lobed, the sides turned back until they meet, lower lip deeply 3-lobed, the lateral lobes reflexed, the middle lobe spreading.

Frequent along streams in the foothills and mountains below the pine belt. May–August.

5. *M. moschatus* Dougl. Soft-villous and very viscid, musk-scented; stems weak and reclining, rooting at the nodes, 2–6 dm. long, from perennial creeping rootstocks; leaves oblong-ovate, about 2.5 cm. long, remotely dentate, petiolate; calyx-teeth somewhat unequal, about half the length of the tube; corolla yellow, 1.5 cm. long; capsule ovate, acute.

Occasional along streams about Los Angeles. May–July.

5a. *M. moschatus sessilifolius* Gray. Stems ascending, corolla 2.5 cm. long; otherwise as in the type.

Frequent in all the mountains in the pine belt and often extending along the streams down into the chaparral belt.

6. *M. parishii* Greene. Annual, erect, rather stout, 3–6 dm. high, very villous and slimy; leaves lanceolate-oblong, sessile, 2.5–5 cm. long, dentate or denticulate; pedicels mostly rather short; calyx cylindraceous, 10–12 mm. long in fruit; its teeth short-triangular; corolla slightly exceeding the calyx-teeth, light rose color.

Occasional along streams. April–July.

7. *M. floribundus* Dougl. Annual, slender, diffuse, 1–3 dm. high, villous and very slimy, musk-scented; leaves ovate, 1–2.5 cm. long, dentate, short-petioled; pedicels mostly longer than the leaves; calyx narrowly campanulate, 4–6 mm. long; the teeth nearly equal, 1 mm. long; corolla light yellow, mostly twice as long as the calyx; capsule globose-ovate, obtuse.

Frequent along streams, especially in the foothills and mountains. April–August.

8. *M. langsдорffii grandis* Greene. Perennial from stoloniferous or creeping basal branches, glabrous or sparsely pubescent; stems stout, fistulose, often 6–8 dm. high; leaves mostly elliptic, often 6–8 cm. long, irregularly dentate, the lower petioled, the upper sessile; flowers in a terminal raceme; calyx in anthesis 8–12 mm. long, in fruit somewhat longer and nearly twice as broad; upper calyx-teeth

somewhat longer; corolla yellow with purple or brown dots in the throat, 2.5–5 cm. long. (*M. luteus* in part of recent authors, not of L.)

Frequent along streams and variable. March–June.

9. *M. nasutus* Greene. Annual, glabrous or minutely pubescent, decumbent at base, 2–4 dm. high; leaves mostly subbasal, ovate-cordate to reniform-cordate, acute, coarsely toothed or lobed, the lowest on broad petioles, the floral reduced to bracts; peduncles hardly exceeding the mature calyx or the lower much elongated; calyx broadly campanulate, its teeth acute, very unequal, the upper one twice the length of the others; corolla about 1.5 cm. long, little surpassing the calyx, deep yellow, with or without a large purple blotch on the lower lip.

Common along streams in the mountains and foothills below the pine belt. April–August.

10. *M. microphyllus* Benth. Annual, glabrous below, somewhat pubescent above; stems terete, slender, with ascending branches or commonly simple, 1–3 dm. high; flowers in short racemes or in depauperate forms, solitary; leaves ovate to orbicular, often cordate at the base, denticulate or coarsely toothed; peduncles slender; calyx often dotted, oblique at the orifice; the teeth obscure or prominent, the upper one largest; corolla 1–2 cm. long, throat rather narrow, the limb broad, usually without purple dots.

Occasional along streams in the pine belt of all our mountains. June–August.

9. MIMETANTHE Greene.

Erect branching annual, with long villous white hairs, opposite leaves, and small yellow flowers. Calyx short-campanulate, deeply 5-cleft, its tube slightly 5-sulcate, not prismatic angled. Corolla obscurely bilabiate, its lobes plane. Stamens 4, 2 fertile. Capsule pointed, loculicidal, dehiscent the whole length of the upper side and on the lower side along the apical attenuation.

1. *M. pilosa* (Benth.) Greene. At length much branched, leafy, flowering from near the base, 1–3 dm. high, herbage glandular-viscid; leaves lanceolate or narrowly oblong-ovate, entire, sessile; flowers on slender pedicels; the upper tooth of calyx much longer than the others, equaling the tube; corolla yellow, the lower lobes usually with brown spots, slightly exceeding the calyx, 6–8 mm. long; capsule oblong-ovate, attenuate. (*Mimulus exilis* Durand.)

Frequent along streams in the valleys and in the mountains. May–August.

10. VERONICA L. SPEEDWELL.

Annual or perennial herbs, with opposite and alternate, rarely verticillate leaves, and mostly small terminal or axillary racemose spicate or solitary flowers. Calyx

mostly 4-parted, sometimes 5-parted. Corolla rotate, its lobes very short, deeply and more or less unequally 4-lobed or rarely 5-lobed. Stamens 2, divergent, inserted on either side at the base of the upper corolla-lobe. Anther-sacs confluent at the apex. Ovary 2-celled; style slender; stigma capitate. Capsule more or less compressed, emarginate, obcordate or 2-lobed, loculicidally dehiscent.

1. *V. peregrina* L. Annual, glabrous or somewhat glandular-puberulent; stems erect or ascending, simple or branched, 1-3 dm. high; leaves oblong, oval, linear or slightly spatulate, 6-20 mm. long, the lowest opposite, short-petioled or sessile, broader than the upper and mostly entire, each with a short-pedicelled flower in its axil; flowers nearly white, about 2 mm. broad; capsule nearly orbicular, obcordate, 2-3 mm. high.

Occasional along the margins of streams and in the dry beds of winter pools. April-July.

2. *V. byzantina* (S. & S.) B. S. B. Annual, pubescent; stems diffusely branched, spreading or ascending, 1.5-4 dm. long; leaves ovate or oval, short-petioled, crenate-dentate or somewhat incised, 8-24 mm. long, the lowest opposite, the upper alternate, each with a slender-peduncled flower in its axil; pedicels filiform, equaling or exceeding the leaves; corolla 6-8 mm. broad, blue; capsule 6 mm. broad, half as high, shallowly and broadly emarginate. (*V. buxbaumii* Tenore.)

Occasional about Los Angeles, *Davidson*.

11. CASTILLEIA Mutis.

Herbs or suffrutescent plants with alternate sessile leaves and red or yellow flowers in terminal leafy-bracted spikes, the bracts and calyx often brightly colored. Calyx tubular, cleft in front or behind or commonly both, the lobes entire or 2-toothed. Corolla very irregular, its tube about equaling the calyx, the limb 2-lipped; the upper lip (galea) arched, elongated, concave or keeled, laterally compressed, entire, enclosing the 4 didynamous stamens; lower lip short, 3-lobed. Anther-sacs oblong or linear, unequal, the outer one attached to the filament by its middle, the inner one pendulous from its apex. Style filiform; stigma entire or 2-lobed. Capsule ovoid or oblong, loculicidally dehiscent, many-seeded. Seeds reticulated.

Annual.
Perennials.

1. *C. stenanthæ*.

Herbage green.

Stems glandular-villous.

Stems minutely and sparsely puberulent.

Herbage white-woolly throughout.

2. *C. martini*.

3. *C. californica*.

4. *C. foliolosa*.

1. *C. stenanthæ* Gray. Stems mostly simple, erect, 3–6 dm. high, pubescent and somewhat viscid throughout; leaves linear-lanceolate, entire, the upper with red linear tips which become spirally coiled; flowers scattered in a loose raceme, short-pedicelled; calyx wholly green, about equally cleft before and behind to near the middle; the segments lanceolate and acute or acutely 2-cleft at the apex; corolla about 3 cm. long; galea usually reddish, slightly falcate, a half longer than the tube; capsule oblong.

Frequent in all our mountains along streams in moist places. May–August.

2. *C. martini* Abrams. Stem rather slender, branching from near the somewhat woody base, decumbent at base, the branches ascending, villous and viscid throughout; lower leaves linear or broadly linear, 2.5–3 cm. long, the upper mostly somewhat broader, divided to near the middle into 3 lobes, the 2 lateral lobes spreading, narrower than the middle one; bracts similarly lobed, somewhat dilated, scarlet-tipped; racemes narrow and rather loose, 1–2 dm.

long; calyx 14–16 mm. long, cleft nearly to the middle behind, scarcely as deep in front, the segments broadly lanceolate, 2-toothed, the teeth less than 2 mm. long, the anterior one much the shorter; galea reddish in front, 1 cm. long, equaling or slightly exceeding the tube; capsule acute, 1 cm. long.

Common on dry ridges and slopes in all our mountains, confined mostly to the chaparral belt. April–August.

3. *C. californica* Abrams. Stems slender, fragile, branched from a scarcely woody base, erect, more or less branched above, 4–5 dm. high, sparsely and minutely puberulent; upper cauline leaves linear, remotely and obscurely denticulate or entire, 2–4 cm. long, 2–3 mm. broad, obtuse, with short slender leafy branchlets in their axils; inflorescence at first viscid-pubescent, becoming nearly glabrous, 1–2 dm. long; bracts red or red-tipped, about 2 cm. long, 3–4 mm. broad, entire or rarely with 1 or 2 very short lateral teeth toward the apex; calyx about 2.5 cm. long, cleft about equally before and behind, the lobes 1 cm. long, cleft at the apex, the teeth lanceolate, 3–4 mm. long, acute; corolla 2.5–3 cm. long, galea about three-fourths the length of the tube, green on the back, the face bright red, the tube greenish-yellow.

Occasional in dry washes and fans in the interior valleys.

4. *C. foliolosa* H. & A. Suffrutescent with many stems from the base, 3–4 dm. high, white woolly throughout; leaves linear and entire, rather crowded below and fascicled in the lower axils, 3 cm. long or less; the uppermost and bracts 3-parted into linear lobes; bracts with lobes spatulate-dilated at apex, the middle lobe largest, shallowly 3-lobed; spikes rather dense; flowers about 18 mm. long, galea only slightly exceeding the calyx, shorter than or as long as the tube; calyx-lobes truncate or retuse; capsule about 1.5 cm. long.

Frequent on dry hillsides in the foothills.

12. **ORTHOCARPUS** Nutt.

Annual or rarely perennial herbs, mostly with alternate leaves, and yellow white or purple flowers in bracted usually dense spikes, the bracts sometimes brightly colored. Calyx tubular, 4-cleft or sometimes split down both sides. Corolla very irregular, the tube slender, the limb 2-lipped; upper lip but little exceeding the inflated 3-plaited or 3-saccate lower one. Otherwise as in *Castilleja*.

Filaments pubescent; galea bearded.

1. *O. purpurascens*.

Filaments glabrous; galea not bearded.

Corolla 3-saccate their whole length.

2. *O. densiflorus*.

Corolla conspicuously 3-saccate, the sac as broad as long.

3. *O. parishii*.

1. **O. purpurascens** Benth. (OWL-CLOVER.) Annual, erect, rather stout, at length much branched from the base, 1.5–5 dm. high, villous-pubescent; leaves with lanceolate base or body, and laciniately 1–2-pinnately parted into narrow linear or filiform lobes, or the upper palmately cleft; spike thick and dense; bracts equaling the flowers, somewhat dilated, their lobes crimson-colored, as are also the calyx and corolla; corolla 2.5–3 cm. long, the lip moderately saccate, white-tipped, with yellow and purple markings; galea densely purple-bearded on the back, incurved at tip; filaments hairy.

Common in sandy soils in the valleys and hills.

2. **O. densiflorus** Benth. Annual, erect, simple or branched from the base, 1–3 dm. high, soft-pubescent above; leaves linear or linear-lanceolate, entire or with a few slender lobes; spike dense, the lowest flowers sometimes distant; bracts about equaling the flowers, 3-cleft into linear purple lobes; corolla 18–20 mm. long, purple; lip moderately ventricose and somewhat 3-saccate for its whole length, the teeth or lobes conspicuous, erect, oblong-linear; galea narrow, puberulent or nearly smooth.

Hills near Los Angeles, *Greata*.

3. **O. parishii** Gray. Annual, nearly glabrous, about 2 dm. high; leaves 3–5-cleft into linear-filiform divisions, or the lower entire; floral ones similar, the lobes purple-tipped; spikes dense and short; calyx-lobes lanceolate, obtuse, half the length of the tube; corolla rose-purple, little pubescent in the throat; lip conspicuously 3-saccate; the sacs as broad as long, the teeth very short; galea lanceolate, obtuse, puberulent.

Near Garvanza, *Davidson*.

13. **ADENOSTEGIA** Benth.

Annuals with alternate narrow entire or 3–5-parted leaves, and irregular flowers scattered along the usually

many branches or in terminal clusters or heads. Bracts and calyx never colored. Calyx spathe-like, consisting of an anterior and a posterior leaf-like division or the anterior division wanting. Corolla tubular, somewhat enlarged above; its lips about equal in length, the lower obtusely 3-toothed. Stamens 4 or 2, anther-cells unequal, ciliate or minutely bearded. Capsule flattened; seeds with a loose coat, pointed at one end.

1. *A. filifolia* (Nutt.) Abrams. Stems erect, branched, 3–6 dm. high; leaves all filiform, 3-parted to near the base; herbage pubescent with short reflexed hairs intermingled with scattered spreading hispid hairs; heads several-flowered, terminating the branches; bracts 3-lobed to near the base, the entire portion about 1 mm. broad, strongly 3-nerved; the lobes all filiform and usually nearly equal, the outer surface very hispid with stout spreading hairs rising from postulate bases, the inner surface concave, pubescent, slightly elongated at the apex and tipped with a blackish, more or less retuse gland; corolla purplish, 12–15 mm. long. (*Cordylanthus filifolius* Nutt.)

Common on dry ridges in the chaparral belt of all the mountains. *Adenostegia rigida* Benth., to which our southern plants have been referred, has broader leaves and bracts which are less hispid.

2. *A. maritima* (Nutt.) Greene. Corymbosely branched, 1–3 dm. high; herbage glaucous and more or less hoary-pubescent, often tinged with purple; leaves linear to linear-lanceolate, about 2 cm. long, entire; flowers in short spikes; bracts oblong-lanceolate, entire or commonly 3-toothed, the 2 lateral teeth much the smaller; flowers purple, equaling or slightly exceeding the bracts.

Occasional in salt marshes near the sea. June–September.

14. PEDICULARIS L.

Perennial herbs with alternate opposite or rarely verticillate pinnately lobed cleft or pinnatifid leaves, and irregular flowers in terminal spikes or spike-like racemes. Calyx 2–5-cleft, corolla tubular, strongly bilabiate; galea arched and compressed; lower lip of 3 small rounded lobes or teeth. Stamens 4; anthers approximate in pairs, their sacs transverse, equal. Capsule flattened, oblique at apex, loculicidally 2-valved.

1. *P. densiflora* Benth. Stems simple, erect, 2–3 dm. high, commonly several from the scaly caudex; herbage nearly glabrous or somewhat soft-pubescent; leaves pinnately divided or parted, the segments oblong, doubly serrate-toothed or incised; spike terminal, dense or at length loose; bracts linear, ciliate or serrulate toward the apex, mostly shorter than the flowers; calyx 5-angled, equally or unequally 5-toothed, 6–8 mm. long; corolla crimson, 2.5 cm. long

or more; galea large, somewhat broader above, strongly arched, lower lip small, of 3 rounded teeth; filaments glabrous.

Laurel Canyon, Santa Monica Mountains, *Davidson*. February.

2. *P. semibarbata* Gray. Nearly acaulescent, depressed, more or less pubescent; leaves in a basal tuft, 15–20 cm. long, on petioles mostly exceeding the irregular sessile spikes, 2-pinnately parted or nearly so, the oblong lobes laciniately few-toothed; corolla yellowish, tinged with purple, pubescent without, about 2 cm. long; galea nearly straight; filaments villous above.

Frequent on dry ridges in the open pine forests of all the mountains. May–July.

Family 95. OROBANCHACEAE.

BROOM-RAPE FAMILY.

Erect simple or branched, brown, yellow, purplish or nearly white root-parasites. Leaves reduced to alternate appressed scales. Flowers perfect, irregular, sessile in terminal bracted spikes, or solitary and peduncled in the axils of the scales. Calyx 4–5-toothed or 4–5-cleft, or split on one or both sides nearly or quite to the base. Corolla more or less oblique, the limb 2-lipped, 5-lobed. Stamens 4, didynamous, inserted in the tube of the corolla alternate with the lobes, a fifth rudimentary one sometimes present. Ovary superior, 1-celled, with 4 parietal placentæ; ovules numerous; style slender; stigma discoid, 2-lobed or 4-lobed. Capsule 1-celled, 2-valved.

Flowers bractless, nearly regular.
Flowers bracteate, strongly 2-lipped.

1. *THALESIA*.
2. *OROBANCHE*.

1. *THALESIA* Raf.

Glandular or viscid-pubescent simple-stemmed herbs, parasitic on the roots of various plants, with scattered scales, and long-peduncled yellowish white or violet, perfect bractless flowers. Calyx campanulate or hemispheric, nearly equally 5-cleft, the lobes acute or acuminate. Corolla oblique; the tube elongated, curved; the limb slightly 2-lipped; the upper lip erect-spreading, 2-lobed; the lower spreading, 3-lobed, the lobes all nearly equal. Stamens included; anther-sacs mucronate at the

base. Ovary ovoid; style slender, deciduous; stigma peltate or slightly 2-lobed.

1. **T. fasciculata** (Nutt.) Britton. Stem erect, 5–10 cm. high, densely glandular-pubescent, bearing several scales and 3–15 naked 1-flowered peduncles, 2.5–10 cm. long; calyx broadly campanulate, 6–10 mm. long, its lobes triangular-lanceolate or triangular-ovate, acute, equaling or shorter than the tube; corolla about 2 cm. long, purplish-yellow, puberulent within; the curved tube 3 times as long as the limb; the lobes oblong, obtuse. (*Aphyllon fasciculatum* Gray.)

Occasional in rather dry ground in the San Gabriel and Santa Ana Mountains; growing on the roots of various shrubs. May–July.

2. OROBANCHE L.

Glandular-pubescent, erect, simple or branched herbs, parasitic on the roots of various plants, with scattered scales, and spicate or racemose perfect bracted and sometimes bracteolate flowers. Calyx split both above and below, nearly or quite to the base, the divisions 2-cleft or rarely entire, or more or less unequally 2–5-toothed. Corolla oblique, strongly 2-lipped; upper lip erect, emarginate or 2-lobed; lower lip spreading, 3-lobed. Stamens included; anther-sacs mostly mucronate at the base. Ovary ovoid; style slender, commonly persistent; stigma peltate to funnelform, entire or slightly 2-lobed.

1. **O. californicum** C. & S. Viscid-pubescent; stems stout, usually simple, 5–15 cm. high; flowers crowded in a dense raceme; pedicels 2–4 or the lower sometimes 10 cm. long; bractlets close to the calyx; calyx-segments linear-lanceolate, about equaling the yellowish or purplish corolla, this 2–2.5 cm. long; anthers glabrous or slightly hairy.

Elysian Park, *Davidson*.

2. **O. tuberosa** (Gray) Heller. Pruinose-puberulent; stems stout, with a thickened tuber-like base, 15 cm. high or less; spikes dense, corymbose-glomerate at the summit of the thickened stem; flowers subsessile or on short pedicels; calyx-lobes lanceolate, equaling the corolla-tube; corolla yellowish, about 10–15 mm. long; anthers glabrous.

Echo Mountain among shrubs, *Mc Clatchie*.

Family 96. PLANTAGINACEAE.

PLANTAIN FAMILY.

Annual or perennial mostly acaulescent rarely stoloniferous herbs, with basal, in the caulescent species oppo-

site or alternate, leaves, and small perfect, polygamous or monœcious flowers, bracteolate in dense terminal long-scaped spikes or heads, or rarely solitary. Calyx persistent, 4-parted. Corolla hypogynous, scarious or membranous, mostly marcescent, 4-lobed. Stamens 4 or 2, inserted on the corolla-tube or throat; filaments filiform; anthers versatile, 2-celled, longitudinally dehiscent. Ovary superior, 1-2-celled or falsely 3-4-celled. Style filiform, simple, mostly longitudinally stigmatic. Ovules 1-several in each cell. Fruit a membranous or coriaceous capsule, circumscissile at or below the middle. Seeds peltate.

1. *PLANTAGO* L. PLANTAIN.

Characters of the family.

Corolla closed over the mature capsule, forming a beak.

1. *P. hirtella*.

Corolla remaining expanded.

Perennials.

Leaves oblong-lanceolate, more or less villous; seeds 2.

2. *P. lanceolata*.

Leaves ovate, glabrous or sparsely pubescent; seeds several.

3. *P. major*.

Annuals.

Leaves silky-pubescent.

4. *P. erecta*.

Leaves glabrous.

5. *P. bigelovii*.

1. *P. hirtella* H. B. K. Perennial from a thick root, hirsute, especially the scape and leaves; leaves oblong-oblancheolate to narrowly oblong, 5 dm. long or less, tapering below to a short petiole, sparsely dentate; scape usually longer than the leaves, stout, erect; spike 15-30 cm. long, dense, except at base; corolla persistent, its lobes closed over the capsule; seeds 3.

Occasional in low ground in the coast valleys.

2. *P. lanceolata* L. More or less villous with tufts of brownish hairs at the base of the leaves; leaves erect or spreading, oblong-lanceolate, tapering at base into a slender petiole, strongly 3-5-ribbed, 3 dm. long or less, entire; scapes exceeding the leaves, channeled, slender; spike very dense, becoming cylindric, 10 cm. long or less; sepals ovate, with green midrib and scarious margins; pyxis oblong; ovary obtuse, 2-seeded, circumscissile at about the middle.

Common in low ground throughout our range.

3. *P. major* L. Glabrous or sometimes sparsely pubescent; leaves spreading, long-petioled, mostly ovate, narrowed or rounded

at base, entire or coarsely dentate, 2 dm. long or less; scapes exceeding the leaves, erect, 3 dm. long or less; spikes 2 dm. long or less; pyxis ovoid, circumscissile at about the middle, 5-16-seeded.

Frequent in low ground.

4. *P. erecta* Morris. Annual, silky pubescent, 6-15 cm. high; leaves erect, narrowly linear to narrowly oblanceolate, about two-thirds the length of the scapes or nearly equaling the shorter ones; scapes 1 or few; spikes few-many-flowered, capitate or oblong, 15 cm. long or usually less; calyx-lobes obtuse, scarious-margined with brownish midrib; pyxis ovate, truncate, purplish above, circumscissile at the lower third; seeds 2.

Very common on dry plains and in the foothills throughout our range.

4a. *P. erecta obversa* (Morris) Abrams. A more robust form; leaves with few to several callous denticulations; scapes usually numerous; spikes 15-40 cm. long; capsule circumscissile near the middle. (*P. obversa* Morris.)

Occasional in sandy soil toward the coast, also on Catalina Island. In our opinion not a good species and scarcely worthy of varietal distinction.

5. *P. bigelovii* Gray. Very slender, annual, 1 dm. high or less leaves very narrowly linear or filiform, glabrous; scapes very slender, slightly pubescent above; spikes slender, about 15 mm. long and 4 mm. broad, often much shorter and reduced to 4-5 flowers; calyx broadly scarious-margined; pyxis oblong-ovate, much exceeding the calyx, circumscissile at the lower third.

Known within our limits only from Inglewood, where it occurs in low exsiccated places.

Family 98. RUBIACEAE. MADDER FAMILY.

Herbs or woody plants with simple, opposite or verticillate, mostly stipulate leaves, and perfect, often dimorphous or trimorphous regular flowers. Calyx-tube adnate to the ovary, its limb various. Corolla 4-5-lobed, often pubescent within. Stamens as many as the lobes of the corolla and alternate with them, inserted on its tube or throat; anthers versatile, 2-celled, longitudinally dehiscent. Ovary inferior, 2-5-celled; style simple or lobed; ovules 1-many in each cell. Fruit a capsule or berry. Seeds various.

1. GALIUM L. BEDSTRAW.

Annual or perennial herbs or rarely suffrutescent, with 4-angled slender stems and branches, apparently

verticillate leaves, and small white green yellow or purple flowers, mostly in axillary or terminal cymes or panicles. Flowers perfect or rarely diœcious. Calyx-tube ovoid or globose, the limb minutely toothed or wanting. Corolla rotate, 4-lobed. Stamens 4, alternate with the corolla-lobes; filaments short. Ovary 2-celled; ovules 1 in each cavity. Styles 2, short; stigmas capitate. Fruit biglobular, dry or fleshy, smooth, tuberculate or hispid, separating into 2 indehiscent carpels.

Annual.

1. *G. aparine*.

Perennials.

Fruit dry.

Flowers perfect; fruit smooth.

2. *G. trifidum*.

Flowers diœcious; fruit hispid.

Herbage green, glabrous or scabrous.

3. *G. angustifolium*.

Herbage cinereous-puberulent.

4. *G. siccatum*.

Fruit fleshy.

Leaves not acerose-subulate.

Fruit hispid, white, turning black in drying.

Suffrutescent, usually climbing.

5. *G. grande*.

Herbaceous, usually in low tufts.

6. *G. californicum*.

Fruit smooth, purple.

7. *G. nuttallii*.

Leaves acerose; plants growing in tufts.

8. *G. andrewsii*.

1. *G. aparine* L. Diffuse, weak, climbing over herbaceous plants, setulose or hispidulous-roughened; leaves in whorls of 7-8, oblong-lanceolate, obtuse or the upper acute, mucronate, tapering to a rather narrow base, 15-45 mm. long; flowers white or whitish; fruit thickly beset with whitish hooked hairs.

Frequent on grassy hillsides in shady places. March-April.

2. *G. trifidum subbiflorum* Wiegand. Perennial with slender rootstock and slender weak wholly herbaceous ascending stems, 4 dm. high or less, much branched and intermingled, sharply 4-angled, somewhat scabrous; leaves in 4's, linear-spatulate, very unequal, 8-10 mm. long, obtuse, cuneate at the base, flaccid and nearly smooth; pedicels capillary, equaling the leaves, nearly glabrous, rarely 2-3-flowered; corolla minute, white, its lobes trifid, very obtuse; fruit glabrous.

Occasional in shady places, mostly in the interior valleys.

3. *G. angustifolium* Nutt. Suffrutescent at base, 3-8 dm. high, with rigid virgate branches, glabrous or minutely scabrous; leaves narrowly linear, 1-nerved, 12-20 mm. long; diœcious; cymes small, in narrow panicles, the fertile ones more or less condensed; corolla dull white, about 3 mm. broad; bristles of the fruit about the length of the body.

Frequent on sand-dunes along the seashore, and in the foothills, often ascending to 4000 feet altitude.

4. *G. siccatum* Wight. Somewhat suffrutescent below, branched and bushy, sometimes reclining, the whole plant cinereous-puberulent; leaves linear, 8–16 mm. long, not rigid, barely mucronulate; inflorescence cymose-paniculate; flowers polygamous, greenish-yellow; fruit 2 mm. broad, densely hispid with straight hairs.

Wilson's Peak, *McClatchie*; Santa Monica Mountains.

5. *G. grande* McClatchie. Suffrutescent, evergreen, the woody stems 6–10 mm. in diameter, 10–24 dm. long, erect or reclining on bushes; herbaceous branches and leaves cinereous-hirsute or hispidulous; leaves in 4's, elliptic-oblong, acute or acuminate, 6–12 mm. long; flowers numerous, polygamous, greenish-yellow, terminal or sometimes axillary, 1–5 on a peduncle, 2–5 mm. broad; ovary densely hirsute; mature fruit baccate, clothed with stiff hairs, at first white, becoming black, about 4 mm. broad.

Frequent in the upper portions of the chaparral belt of the San Gabriel Mountains.

6. *G. californicum* H. & A. Wholly herbaceous, from slender creeping rootstocks, often in low tufts, 8–30 mm. high, hirsute throughout; stems slender; leaves in 4's, thin, ovate to elliptic, acute or acuminate, 6–12 mm. long; flowers polygamous, few, terminal, yellowish-white; fruit baccate, clothed with scattered hairs, pearly white, changing to black in drying, 2–3 mm. in diameter.

Frequent in all the mountains, mostly above 3000 feet altitude.

7. *G. nuttallii* Gray. Suffrutescent below, often climbing, 6–15 dm. high, the angles of the stems and margins of the leaves roughened or hispidulous, otherwise glabrous; leaves in 4's, thickish, oval to linear-oblong, mucronulate or obtuse, 3–6 mm. long; fruit glabrous, purple, 4 mm. broad.

Common in the foothills throughout our range.

8. *G. andrewsii* Gray. Densely matted, the prostrate stems rooting at the joints, 5–10 cm. long, grayish, sparsely scabrous or smooth; leaves crowded, acrose-subulate, 4–8 mm. long; flowers dioecious, male slender-pedicelled in few-flowered terminal cymes, female solitary, subtended by a whorl of leaves which are longer than the at length reflexed pedicel; berry whitish, becoming dark-colored.

On dry ridges in the upper portions of the chaparral belt and extending into the pine belt of the San Gabriel, San Bernardino and Cuyamaca Mountains.

Family 99. CAPRIFOLIACEAE.

HONEYSUCKLE FAMILY.

Shrubs, trees, vines or perennial herbs, with opposite simple or pinnate leaves, and perfect, regular or irregular, mostly cymose flowers. Calyx-tube adnate to the ovary, its limb 3–5-toothed or 3–5-lobed. Corolla 5-

lobed, sometimes 2-lipped. Stamens 5, rarely 4, inserted on the corolla-tube and alternate with its lobes; anthers versatile, 2-celled, longitudinally dehiscent. Ovary inferior, 1-6-celled; style slender; stigma capitate or 2-5-lobed; ovules 1-several in each cavity. Fruit a berry, drupe or capsule.

Leaves pinnately compound; flowers rotate. 1. *SAMBUCUS*.

Leaves simple.

Berry white; corolla short campanulate. 2. *SYMPHORICARPUS*.

Berry red or black; corolla tubular, somewhat irregular. 3. *LONICERA*.

1. *SAMBUCUS* L. ELDER.

Shrubs or trees, with opposite pinnate leaves, serrate or lacinate leaflets, and small white or pinkish flowers in compound depressed or thyrsoïd cymes. Calyx-tube ovoid or turbinate, 3-5-toothed or 3-5-lobed. Corolla rotate or slightly campanulate, regular, 3-5-lobed. Stamens 5, inserted at the base of the corolla; filaments slender. Ovary 3-5-celled; style 3-parted; ovules 1 in each cell, pendulous. Drupe berry-like, containing 3-5 1-seeded nutlets.

1. *S. cœrulea* Raf. Bushy or arborescent, 2-5 m. high, the largest specimens tree-like; leaves coriaceous, glabrous; leaflets 5-7, lanceolate, ovate or obovate, mostly abruptly acuminate, serrate except at the acuminate apex, 2.5-8 cm. long; inflorescence 5-rayed, each ray again 1-3 times 5-rayed, forming a flat-topped cyme, 8-15 cm. broad; flowers white, 7 mm. broad; fruit blue beneath the white bloom. (*S. glauca* Nutt.)

Frequent on low hills and in washes in all the valleys. May-June.

2. *SYMPHORICARPUS* Juss. SNOWBERRY.

Shrubs with opposite deciduous short-petioled simple leaves, and small white or pink perfect flowers in axillary or terminal clusters. Calyx-tube nearly globular, the limb 4-5-toothed. Corolla campanulate or salver-shaped, regular or sometimes gibbous at the base, 4-5-lobed. Stamens 4-5, inserted on the corolla. Ovary 4-celled, 2 of the cells containing several abortive ovules, the others each with a single suspended ovule; style filiform; stigma capitate or 2-lobed. Fruit an ovoid or globose 4-celled 2-seeded berry.

1. *S. mollis* Nutt. Low, much branched shrub, about 3 dm. high, the branches mostly erect; leaves oval or elliptic, mostly 1 cm. long, pubescent on both surfaces or more so on the lower surface; corolla rose-red, barely pubescent within; berry globose, 8-12 mm. in diameter, pulp snowy.

Frequent in the chaparral belt of all the mountains and foothills.

3. *LONICERA* L. HONEYSUCKLE.

Erect or climbing shrubs with opposite entire leaves, and usually somewhat irregular spicate, capitate or geminate flowers. Calyx-tube ovoid or nearly globular, the limb slightly 5-toothed. Corolla tubular, funnellform or campanulate, often gibbous at base, the limb 5-toothed, more or less oblique or 2-lobed. Stamens 5, inserted on the tube of the corolla. Ovary 2-3-celled; ovules numerous in each cell, pendulous; style slender; stigma capitate. Berry fleshy, usually 2-3-celled, few-seeded.

Inflorescence pubescent.

Uppermost pair of leaves connate.

Leaves all distinct.

Inflorescence glabrous.

1. *L. hispidula*.

2. *L. subspicata*.

3. *L. interrupta*.

1. *L. hispidula californica* (Torr. & Gray) Rehd. Climbing trees and shrubs, often 5 m. high, the branches usually pendent; leaves oblong-ovate, 4-6 cm. long, glabrous above, white and villous beneath; all but the lowest with conspicuous rounded connate stipule-like appendages; inflorescence densely glandular-pubescent; corolla pink, 14-18 mm. long, glandular-pubescent without; berries bright red.

A common species in central California and northward. In southern California it has been found only on Santa Catalina Island. These insular plants differ from the northern specimens, and may prove to be distinct when they are better known.

2. *L. subspicata* H. & A. Bushy, more or less pubescent or glandular above, 1-1.5 m. high; leaves rounded to elliptic, 2 cm. long or less, all distinct and petioled, coriaceous, pale beneath; inflorescence in rather short interrupted spikes, terminating leafy branches; flowers yellow, glandular-pubescent without; corolla-tube 4-5 mm. long; limb equaling the tube, 2-lipped, the upper lip with 4 short rounded lobes, the lower narrow, entire, somewhat gibbous at base; anthers 4 mm. long; filaments pubescent below.

Frequent in the chaparral belt of all the hills and mountains.

3. *L. interrupta* Benth. Stems with a rigid trunk, the branches climbing or reclining on bushes; leaves orbicular-obovate to oval, 2-4 cm. long, glabrous, rarely somewhat pubescent, glaucous beneath, subcoriaceous; inflorescence glabrous, with numerous remote whorls; corolla yellow, 12-15 mm. long, glabrous without.

A common species in the dry chaparral-covered regions of interior California; Newhall; Swartout Canyon.

Family 100. VALERIANACEAE.**VALERIAN FAMILY.**

Herbs with opposite exstipulate leaves, and usually small perfect or polygamous flowers, in corymbed, paniced or capitate cymes. Calyx-tube adnate to the ovary, its limb inconspicuous or none in flower, becoming prominent in fruit. Corolla epigynous, somewhat irregular, its tube narrow, sometimes gibbous or spurred at base; limb spreading, mostly 5-lobed. Stamens 1-4, inserted on the corolla and alternate with its lobes. Ovary inferior, 1-3-celled, 1 of the cells containing a single suspended ovule, the others empty. Fruit indehiscent, dry, containing a single suspended seed.

1. PLECTRITIS DC.

Annual herbs with simple or rarely with very slender branches and usually entire leaves, the cauline commonly sessile. Flowers small, borne in glomerules at the end of the stem or branches, or the glomerules in interrupted or dense spikes. Calyx-limb obsolete. Corolla usually pink, more or less bilabiate, spurred or gibbous at base. Wings of the fruit commonly incurved and forming a circular hollow or cavity on the side.

1. **P. macrocera** T. & G. Slender, 1-2 dm. high; leaves linear or narrowly oblong; corolla about 2 mm. long; the spur longer than the tube; fruit more or less hispid, dorsally carinate; the carina 2-grooved; lateral wings broad, each with a more or less obvious lobe at apex, spreading or incurved. (*Valerianella macrocera* Gray; *P. congesta minor* Hook.)

Occasional on shady hillsides. March.

Family 101. DIPSACEAE. TEASEL FAMILY.

Herbs with opposite or verticillate exstipulate leaves. Flowers perfect, borne on an elongated or globose receptacle, bracted and involucrate. Calyx-tube adnate to the ovary, its limb cup-shaped or disk-shaped, or divided into spreading bristles. Corolla epigynous, the limb 2-5-lobed. Stamens 2-4, inserted on the tube of the corolla

and alternate with its lobes; filaments distinct. Ovary inferior, 1-celled; style filiform; stigma undivided, terminal or lateral; ovule 1, pendulous. Fruit an achene, its apex crowned with the persistent calyx-lobes.

1. DIPSACUS L.

Rough-hairy or prickly, tall erect biennial or perennial herbs, with opposite dentate or pinnatifid, usually large leaves, and blue or lilac flowers in dense terminal peduncled oblong heads. Bracts of the involucre and scales of the receptacle rigid or spiny-toothed. Calyx-limb cup-shaped, 4-toothed or 4-lobed. Corolla oblique or 2-lipped, 4-lobed. Stamens 4. Stigmas oblique or lateral. Achene free or adnate to the involucre.

1. *D. fullonum* L. (FULLER'S-TEASEL.) Biennial, stout, with numerous short prickles on the stem, branches, midribs of the leaves and involucre, otherwise glabrous or nearly so, 1-2 m. high; leaves sessile or the upper ones connate-perfoliate, lanceolate or oblong, entire, the lower obtuse, crenate; leaves of the involucre spreading or reflexed, shorter than the head; heads ovoid, becoming cylindric, 6-10 cm. long; scales of the receptacle with hooked tips, about equaling the flowers; flowers lilac, 8-12 mm. long.

Occasional in moist places about Los Angeles. Native of Europe.

Family 102. CUCURBITACEAE. GOURD FAMILY.

Herbaceous vines, climbing or trailing by means of tendrils, with alternate petioled leaves, and solitary or racemose monoëcious or diëcious flowers. Calyx-tube adnate to the ovary, its limb usually 5-lobed. Petals usually 5, inserted on the limb of the calyx, separate or united. Stamens mostly 3, 2 of them with 2-celled anthers, the other with a 1-celled anther; filaments short, often somewhat united. Ovary 1-3-celled; style simple or lobed; ovules few or numerous. Fruit a pepo, indehiscent or rarely dehiscent at the summit, or bursting irregularly. Seeds usually flat.

Flowers yellow, large; fruit indehiscent, smooth. 1. CUCURBITA.

Flowers white or greenish, small; fruit dehiscent at summit, prickly.

2. MICRAMPELIS.

1. CUCURBITA L.

Rough prostrate vines, rooting at the nodes, with branched tendrils, usually lobed leaves which are often cordate at the base, and large yellow axillary monœcious flowers. Calyx-tube campanulate, usually 5-lobed. Corolla campanulate, 5-lobed to about the middle, the lobes recurving. Staminate flowers with 3 stamens, the anthers linear, more or less united. Pistillate flowers with 1 pistil; ovary oblong, with 3-5 many-ovuled placenta; style short, thick; stigmas 3-5, each 2-lobed, papillose; staminodia 3. Fruit large, fleshy, with a thick rind, many-seeded, indehiscent.

1. *C. foetidissima* H. B. K. (CALABAZILLA or MOCK-ORANGE.) Stems stout, rough, hirsute, trailing to a length of 2-5 m.; root very large, carrot-shaped; leaves ovate-triangular, cordate or truncate at the base, acute at the apex, 1-3 dm. long, denticulate, usually slightly 3-5-lobed, rough above, canescent beneath, on stout petioles, 8-15 cm. long; peduncles 2.5-5 cm. long; flowers mostly solitary; corolla 7-10 cm. long; pepo globose, 5-10 cm. in diameter, smooth. Frequent on dry sandy soil throughout our range.

2. MICRAMPELIS Raf.

Mostly climbing herbs, with branched tendrils, lobed divided or angled leaves, and small white or greenish-white monœcious flowers. Calyx-tube campanulate, 5-6-toothed. Corolla very deeply 5-6-parted. Stamens 3 in the staminate flowers; the anthers more or less coherent. Pistillate flowers with a 2-4-celled ovary; style very short; stigma hemispheric or lobed. Fruit fleshy or dry at maturity, densely spiny, 1-2-celled, dehiscent at the summit.

1. *M. macrocarpa* Greene. Nearly glabrous; stems much branched, climbing over shrubs, from a very large fusiform root; leaves about 1-1.5 dm. broad, with a closed sinus, 5-cleft to the middle or below it, the divisions slightly 3-5-lobed, mucronate; fruit ovoid-oblong, 8-12 cm. long, usually densely echinate with stout but rather soft spines, the longest often 5 cm. long, usually 12-14-seeded; seed ovoid, 18 mm. long, light brown, encircled by a dark marginal line.

Frequent in the hills and in the chaparral belt of all the mountains. February-May. Commonly called chilicothe or wild cucumber.

**Family 103. CAMPANULACEAE. BELL-
FLOWER FAMILY.**

Herbs with alternate exstipulate entire dentate or rarely lobed leaves, acrid and usually milky juice, and racemose, spicate, paniculate or solitary perfect flowers. Calyx-tube adnate to the ovary, its limb mostly 5-lobed or 5-parted. Corolla regular or irregular, its limb 5-lobed, regular or more or less 2-lipped, or corolla rarely divided into separate petals. Stamens 5, alternate with the corolla-lobes, inserted with the corolla on the calyx where it becomes free from the ovary; filaments separate or connate; anthers 2-celled, introrse, separate or united. Ovary 2-5-celled or rarely 6-10-celled, the placentæ projecting from the axis or with 2 parietal placentæ; style simple; stigma mostly 2-5-lobed. Fruit a capsule or berry. Seeds numerous and small; embryo minute, straight; endosperm fleshy. (Including the family *Lobeliaceæ* of some authors.)

Corolla regular; stamens separate.

Capsule opening on the side by 2-3 valves,
which leave small round perforations.

1. LEGOUZIA.

Capsule opening by a hole left by the falling
away of the base of the style.

2. GITHOPSIS.

Corolla irregular; stamens more or less united.

Anthers free, filaments more or less united;
flowers minute.

3. NEMACLADUS.

Anthers connate.

Corolla-tube open to the base on 1 side.

4. LOBELIA.

Corolla-tube closed.

5. PALMERELLA.

1. LEGOUZIA Durand.

Annual herbs with long slender stems and branches, alternate toothed or entire leaves, and axillary 2-bracted flowers sessile or nearly so. The earlier flowers small, cleistogamous, the latter with a blue or purple, nearly rotate corolla. Calyx-tube narrow, the lobes in the earlier flowers 3-4, in the latter 4-5. Corolla 5-lobed or 5-parted, the lobes imbricated in the bud. Filaments flat; anthers separate, linear. Ovary 3-celled or rarely 2-celled or 4-celled; stigma usually 3-lobed. Capsule opening by lateral valves.

1. *L. biflora* (R. & P.) Britton. Glabrous or nearly so; stem simple or branched, roughish on the angles, 15–30 cm. high; leaves ovate, oblong or the upper lanceolate, sessile, acute or obtuse at the apex, crenate with few teeth or entire, 8–20 mm. long; the calyx-lobes of the earlier flowers ovate to lanceolate, of the later lanceolate-subulate; capsule oblong-cylindric, 6–10 mm. long, opening by valves close under the calyx-teeth. (*Specularia biflora* Gray.)

Occasional on grassy slopes.

2. GITHOPSIS Nutt.

Slender annuals with rather small linear-oblong coarsely toothed sessile leaves. Flowers simply terminating the branches or becoming lateral, erect, all alike. Calyx-tube club-shaped, strongly 10-ribbed, adnate to the summit of the ovary, its limb of 5 long and linear foliaceous lobes. Corolla tubular-campanulate, 5-lobed. Filaments short, dilated at the base; anthers long, linear. Ovary 3-celled; stigma 3-lobed. Capsule club-shaped, coriaceous, crowned with the rigid calyx-lobes of its own length, strongly striate-ribbed, many-seeded, opening when the somewhat persistent base of the style falls away by a round hole in its place. Seeds fusiform-oblong.

1. *G. specularioides* Nutt. Stems simple or with 1–2 proliferous branches, 5–20 cm. high, hirsute or glabrate; leaves linear-oblong, 6–10 mm. long, the lower obovate, 2–4 mm. long, all sharply few-toothed; calyx-lobes 6–18 mm. long, shorter than or much exceeding the corolla; corolla purplish, its lobes shorter than the tube; capsule turgid, tapering into a very short peduncle.

Hills about Soldiers Home, *Hasse*.

3. NEMACLADUS Nutt.

Low and diffusely branched annuals, with numerous capillary branches, cauline leaves minute, sessile, subtending the dichotomous branches. Flowers minute on rather long capillary pedicels. Calyx partly or wholly free. Corolla bilabiate, the upper lip 2-lobed or 2-parted, the lower 3-lobed or 3-parted. Filaments monadelphous to near the base; anthers oval, glabrous. Style incurved at the tip; stigmas capitate, 2-lobed. Capsule 2-celled, 2-valved from the tip, 7–40-seeded.

1. *N. ramosissimus montanus* (Greene) Gray. Glabrous throughout or sparsely puberulent below and occasionally with some villous hairs at the base of the pedicels; stems diffusely and dichotomously branched, very slender, 1–2 dm. high; basal leaves obovate, denticulate, 1 cm. long; pedicels 1–1.5 cm. long, curved

upward; calyx about 2 mm. long, the lobes equaling the tube; corolla white, slightly exceeding the calyx; capsule 7-12-seeded; seeds favose-reticulated, ovate-oblong.

Frequent in open pine forests in the San Gabriel and San Bernardino Mountains.

2. *N. ramosissimus pinnatifidus* (Greene) Gray. Much resembling the last; basal leaves linear-lanceolate, 1-2-pinnatifid, the cauline toothed; capsule 15-25-seeded; seeds short-oblong.

San Gabriel Mountains, *Allen*.

4. LOBELIA L.

Herbs with alternate or basal leaves, and racemose, spicate or paniculate, often leafy-bracted flowers. Calyx-tube adnate to the ovary. Corolla-tube straight, oblique or incurved, divided to the base on 1 side, 2-lobed; the lobe on each side of the cleft erect or recurved, turned away from the other 3, which are somewhat united. Stamens free from the corolla-tube, monadelphous at least above; 2 or all the 5 anthers with a tuft of hairs at the tip, all united. Ovary 2-celled; the 2 parietal placentæ many-ovuled; stigma 2-lobed or 2-cleft. Capsule loculicidally 2-valved.

1. *L. splendens* Willd. Glabrous or nearly so; stems erect, commonly simple, 4-8 dm. high; leaves lanceolate or almost linear, glandular-denticulate, all but the lower sessile, 10 cm. long or less; flowers in a rather close often elongated raceme; calyx-tube hemispheric, 4 mm. long, the lobes linear-lanceolate, 8 mm. long; corolla bright red, 2 cm. long, the tube narrow, the lobes about 8 mm. long; seeds oblong, somewhat rugose-tuberculate.

Along streams in wet places in the upper portions of the chaparral belt of the San Bernardino and Cuyamaca Mountains.

5. PALMERELLA Gray.

Slender erect or spreading herbs, glabrous or nearly so, with mostly lanceolate entire or serrate leaves, and blue flowers in short terminal racemes. Calyx-tubes turbinate, the lobes slender. Corolla-tube elongated, linear and straight, not at all dilated at the throat; the short limb abruptly spreading; 2 lobes small, spatulate-linear and recurving, the 3 larger obovate or oblong, slightly united at the base. Filaments more or less adnate to the corolla up to near the throat, then monadelphous and free, or adnate on 1 side only; anthers oblong, the 3 larger naked, the 2 shorter tipped with a tuft of very short bristles. Ovary and capsule as in *Lobelia*.

1. *L. debilis serrata* Gray. Stems simple or rarely branched above, 2-6 dm. high, very leafy, glabrous except the inflorescence, this puberulent; cauline leaves lanceolate-linear or lanceolate, the lower broader, spatulate to obovate, all sharply serrate, the uppermost passing into slender bracts; racemes few-many-flowered; pedicels slender; calyx-lobes narrowly-subulate, twice the length of the tube, and nearly equaling the corolla; corolla-tube slender, 2 cm. long, in age splitting up from the base as in *Lobelia*, pale blue; the larger lobes deep violet, 6-8 mm. long.

Frequent in moist places in the canyons of the San Gabriel and Santa Ana Mountains.

Family 104. ASTERACEAE. ASTER FAMILY.

Annual or perennial herbs or shrubs with alternate or opposite leaves. Flowers in heads, borne on the enlarged summit of the peduncle (receptacle) and surrounded by the bracts of the involucre. Receptacle naked or with bracts subtending the flowers or with bristles among the flowers. Calyx-tube united with the ovary, the limb when present called pappus, and consisting of awns, hairs, bristles, scales or paleæ. Corolla tubular and 5-toothed or 5-lobed, or the limb strap-shaped (ligulate) and toothed or entire at the apex, those of a head all tubular, all ligulate or of both kinds. When both kinds are present the marginal ones are ligulate and are called ray-flowers, the inner are tubular and are called disk-flowers. Stamens 5; filaments free; anthers united and forming a tube, or nearly or quite free in *Ambrosiæ* and the filaments more or less cohering. Styles 2-lobed, the lobes stigmatic on the inner surface. Ovary 1-celled, becoming an achene in fruit. Pappus commonly persistent.

KEY TO THE TRIBES.

Heads all alike.

Heads composed of both ray- and disk-flowers or of disk-flowers only.

Anthers not caudate at base.

Receptacle naked.

Bracts of the involucre well-imbricated.

- Style-branches not stigmatic to the summit.
- Style-branches stigmatic only below the middle; flowers never yellow; rays none. 1. EUPATORIEAE.
- Style-branches of the perfect flowers stigmatic to or above the middle, the upper sterile portion forming a flattened appendage. 2. ASTEREEAE.
- Style-branches stigmatic up to the truncate apex.
- Bracts herbaceous; herbage not aromatic. 7. HELENIEAE.
- Bracts with scarious margins; herbage aromatic or strong-scented. 8. ANTHEMIDEAE.
- Bracts usually in 1 series; pappus generally capillary. 9. SENECTIONEAE.
- Receptacle not naked. 7. HELENIEAE.
- Receptacle fimbriate.
- Receptacle chaffy.
- Bracts of the involucre not scarious.
- Bracts of the involucre in a single series, more or less enclosing the ray-achenes. 6. MADIEAE.
- Bracts of the involucre in 2 or more series not enfolding the ray-achenes. 5. HELIANTHEAE.
- Bracts of the involucre scarious, at least on the margins. 8. ANTHEMIDEAE.
- Anthers caudate at base.
- Anthers not appendaged at apex; involucre usually scarious. 3. INULEAE.
- Anthers appendaged at apex; bracts usually spinescent.
- Corollas regular, all tubular. 10. CYNAREAE.
- Corollas 2-lipped; rays wanting. 11. MUTISIEAE.
- Heads composed of ligulate flowers only. 12. CICHORIEAE.
- Heads of 2 kinds: staminate heads clustered above the pistillate, anthers more or less free; pistillate heads few-flowered, flowers completely enclosed in the prickly involucre. 4. AMBROSIEAE.

Tribe 1. EUPATORIEAE. EUPATORY TRIBE.

Ours herbs or suffrutescent plants with white or flesh-colored perfect disk-flowers and no rays. Receptacle

naked. Anthers not caudate at base. Style-branches stigmatic only below the middle.

Achenes 5-angled.
Achenes 10-ribbed.

1. EUPATORIUM.
2. COLEOSANTHUS.

1. EUPATORIUM L.

Erect mostly branching perennial herbs, with opposite verticillate or alternate often punctate leaves, and cymose-paniculate discoid heads of white, blue or purple flowers. Involucre oblong to hemispheric, its bracts imbricated in 2-several series. Receptacle flat, convex or conic, naked. Corolla regular, its lobes slender, 5-lobed or 5-toothed. Style-branches flattened above, stigmatic at the base. Achenes 5-angled, truncate. Pappus of numerous capillary usually scabrous bristles, arranged in a single row.

1. *E. glandulosum* H. B. K. Stems slender and apparently herbaceous, glandular-puberulent; upper leaves opposite, short-petioled, ovate-deltoid, acute at apex, cordate at base, serrate, thin, minutely atomiferous beneath; cymes rather compact, on dichotomous peduncles longer than the leaves; pedicels 1 cm. long, with 2-3 linear bracts; heads 20-30-flowered; involucre bracts lanceolate, firm, 4 mm. long, prominently 2-ribbed, the acute tips softer; corolla 4-5 mm. long, glabrous, white, the filiform tube twice the length of the abruptly expanded throat; pappus scabrous, equaling the corolla, early deciduous; achenes smooth, 5-angled, slightly arcuate, 1.5 mm. long; receptacle somewhat rounded. (*E. pasadense* Parish.)

Wet bank of a pool in a canyon south of Pasadena, *McClatchie*.

2. COLEOSANTHUS Cass.

Herbaceous perennial or partly shrubby plants, with opposite or alternate leaves and discoid heads of whitish or pink flowers in panicles or cymes. Involucre bracts well-imbricated in several series, striate. Receptacle flat or convex. Achenes 10-striate or -ribbed. Pappus a single row of numerous rough or serrate bristles.

1. *C. californicus* (T. & G.) Kuntze. Shrubby at base, 6-9 dm. high, paniculately branched; herbage somewhat glandular-puberulent; leaves alternate, ovate, somewhat triangular or slightly cordate, obtuse, irregularly crenate-toothed, 3-ribbed from the base, veiny, roughish, 2-4 cm. long, short-petioled; heads spicate or racemose along leafy branches, about 1 cm. high, 10-15-flowered; involucre bracts with thinnish, mostly obtuse straight tips. (*Brickellia californica* Gray.)

Occasional in the canyons of the San Gabriel and Santa Ana Mountains.

2. *C. nevinii* (Gray) Heeler. Herbage white-woolly; leaves repandodentate; heads 30–40-flowered; otherwise as in the last. Newhall, *Nevin*.

Tribe 2. ASTEREAE. ASTER TRIBE.

Annual or perennial herbs or rarely shrubs, with usually scentless herbage and alternate leaves. Receptacle naked. Bracts of the involucre commonly well-imbricated. Disk-flowers commonly yellow. Rays present or wanting. Anthers not caudate. Pappus of bristles or awns. Pollen grains echinate.

Pappus of awns or scales.

Pappus of several caducous awns; heads large.

3. GRINDELIA.

Pappus of several short scales; heads small.

4. GUTIERREZIA.

Pappus of bristles.

Pappus of a few persistent slender bristles.

5. PENTACHAETA.

Pappus of many persistent slender bristles.

Rays present.

Rays yellow.

Rays without pappus.

6. HETEROTHECA.

Rays with pappus like that of disk-flowers.

Pappus of 2 kinds, the outer short and scale-like.

7. CHRYSOPSIS.

Pappus of 1 kind only.

Perennial glabrous or pubescent herbs.

Heads small, in scorpioid racemes.

8. SOLIDAGO.

Heads small in corymbose panicles.

9. EUTHAMIA.

Evergreen woody plants with punctate, flat or terete leaves.

10. ERICAMERIA.

Rays not yellow.

Pappus rusty-brown; anthers with slender appendages at apex.

15. CORETHROGYNE.

Pappus dull white.

Bracts in more than 2 series.

16. ASTER.

Bracts in 1–2 series.

Rays exceeding the disk.

17. ERIGERON.

Rays inconspicuous, shorter than the disk.

18. LEPTILON.

Rays none.

Outer flowers enlarged and more deeply cleft on the inner side.

14. LESSINGIA.

Outer flowers not enlarged.

Flowers yellow.

Bracts of the involucre without green tips.

11. *CHRYSOTHAMNUS*.

Bracts of the involucre with green tips.

Herbage glandular and glutinous.

13. *HAZARDIA*.

Herbage pubescent.

12. *ISOCOMA*.

Flowers not yellow.

Outer flowers pistillate, truncate; inner hermaphrodite.

19. *CONYZA*.

Diœcious shrubs or perennial herbs.

20. *BACCHARIS*.

3. *GRINDELIA* Willd.

Coarse perennial herbs or suffrutescent plants with sessile, rigid mostly serrate leaves and rather large hemispheric heads terminating corymbose branches. Involucral bracts with usually narrow herbaceous squarrose-recurved tips. Flowers of both ray and disk many, permanently yellow. Style-appendages lanceolate or linear. Achenes short, thick, compressed or turgid, truncate, glabrous. Pappus of 2-8 deciduous stout awns or bristles.

Stems herbaceous.

Involucre 10-15 mm. wide; leaves 5-15 mm. wide.

1. *G. camporum*.

Involucre 20-25 mm. wide; leaves 10-30 mm. wide.

2. *G. robusta*.

Stems woody below; salt marsh species.

3. *G. cuneifolia*.

1. *G. camporum* Greene. Herbaceous; stems white and shining, tufted from a perennial root, about 6 dm. high, glabrous, very leafy up to the loosely corymbose heads, even the branches of the corymb conspicuously leafy-bracted; basal leaves almost wanting; stem leaves oblanceolate-spatulate, sessile and clasping, 5 cm. long, saliently serrate-toothed; bracts of flowering branches nearly entire, spreading; involucre 12-20 mm. wide, its bracts with long linear recurved tips; ray-achenes obscurely 3-sided with 3 or more pappus awns; disk-achenes compressed, obliquely biauriculate or unidentate at the summit.

Adobe mesas near Wiseburn. June-August.

2. *G. robusta* Nutt. Stems herbaceous, stout, ascending from a perennial root, about 5 dm. high; leaves broadly cordate-oblong, obtuse, coarsely serrate, about 3.5 cm. long, often 2.5 cm. broad, subcoriaceous, pubescent on the margins, otherwise glabrous; heads very few, large, corymbosely disposed; outer bracts of involucre rather leafy, the others narrow and squarrose; pappus awns 2.

Open grounds about Los Angeles and toward the coast. First collected at San Pedro by Nuttall. May-July.

3. *G. cuneifolia* Nutt. Bushy and suffrutescent, 6–12 dm. high, glabrous; leaves thickish and rather fleshy, 7–10 cm. long, cuneate-spatulate to linear-oblong, entire or sparsely dentate, clasping at the broad base; involucre about 12 mm. high, glutinous, its bracts all with squarrose green tips; pappus awns usually several, compressed barbellulate.

Borders of salt marshes along the coast. September–November.

4. *GUTIERREZIA* Lag.

Herbaceous or suffrutescent, freely branching, somewhat resiniferous, nearly glabrous plants, with alternate linear entire leaves, and numerous small heads corymbosely arranged at the ends of the branches. Involucral bracts coriaceous, the outer successively shorter. Ray- and disk-flowers yellow. Achenes angled or striate, mostly silky. Pappus paleaceous.

1. *G. divergens* Greene. Suffrutescent, 4–7 dm. high, glabrous or merely granular-scaberrulous, the paniced branches nearly destitute of foliage at flowering time; involucre 6 mm. high, obovate-turbinate, their obovate obtuse bracts well-imbricated and with blunt green tips; disk-flowers 5–7; rays about 5; paleæ of the pappus 9–12, very unequal, narrow and acute.

Common on the interior plains and foothills, especially common on the fans at the base of the mountains. July–August.

5. *PENTACHAETA* Nutt.

Small slender nearly glabrous annuals, with alternate linear entire leaves, and mostly small heads solitary or somewhat clustered at the ends of more or less naked branches. Involucre hemispheric or campanulate, its bracts in 2 series, scarious-margined, appressed, mucronate. Ray-flowers white, yellow or wanting. Disk-flowers yellow, very slender. Style-appendages filiform-subulate, hispid. Achenes pubescent. Pappus of 3–5 slender bristles.

1. *P. aurea* Nutt. Diffusely branching, 1–3 dm. high, somewhat villous-pubescent; heads about 10–15 mm. broad, many-flowered; flowers all yellow; rays obtuse, 20 or more; involucral bracts broadly lanceolate, setaceously acuminate, with green middle portion and scarious margins; achenes somewhat villous-pubescent; pappus bristles 5–8.

Arroyo Seco, *Davidson*. Frequent in the Santa Ana Mountains and common throughout the coast slope of San Diego County.

2. *P. lyoni* Gray. Hirsute, at least the margins of the plane linear or spatulate-linear leaves, 1–1.5 dm. high, with the sparing ascending branches leafy up to the head or short peduncle; in-

volucre hirsute; its bracts linear-lanceolate and of nearly equal length, green, with narrow scarious margins; pappus-bristles 9-11 or commonly 12.

San Pedro; Santa Catalina Island, *Lyon*.

6. *HETEROTHECA* Nutt.

Annual or biennial hirsute herbs, with alternate leaves and a terminal corymbose panicle of middle-sized heads. Involucre ovate, its bracts closely imbricated in many series, without spreading tips. Flowers yellow, those of the ray pistillate, of the disk perfect. Style-appendages of the disk-flowers ovate or lanceolate. Achenes compressed, pubescent, those of the ray thin-triquetrous, with caducous pappus or none. Pappus of disk-achenes of an outer series of sparse short bristles and an inner series of copious longer ones.

1. *H. grandifolia* Nutt. Annual or biennial, 1-2 m. high, hirsute, the inflorescence viscid and strong-scented; stem leaves oval or oblong, coarsely toothed, partly vertical by a twist in the petiole, this bearing at base 2 stipuliform lobes; involucre about 1 cm. high; ray-achenes without pappus; those of the disk with but faint traces of the outer and shorter bristles.

Frequent in waste places in sandy soil. June-November, or in favored places flowering throughout the year.

7. *CHRYSOPSIS* Ell.

Low perennial herbs or somewhat suffrutescent, with sessile usually entire leaves, and middle-sized heads terminating corymbose or fastigate branches. Involucre ovate or broader, its bracts narrow, regularly imbricated in several series. Flowers yellow. Style-appendages linear-filiform to slender-subulate. Achenes compressed, obovate to linear-fusiform. Pappus brownish, of many capillary scabrous bristles, with or without an outer series of short bristles of paleæ.

1. *C. sessilifolia* Nutt. Slender, sparsely pilose-hispid, viscid-glandular; leaves oblanceolate, sharply pointed, the longest often 3-4 cm. long; corymbose branches ending in about 3 subsessile heads; these about 12 mm. high, leafy-bracted at base; involucral bracts viscid-glandular; achenes slender-fusiform, silky-pubescent; outer pappus slenderly squamellate.

Along the coast, *Davidson*.

2. *C. fastigiata* Greene. Stems several, ascending, 3-6 dm. high, rigid and brittle, densely clothed with small ascending, erect leaves; these strongly crisped, 12 mm. long or less, sessile, acute, densely

silky-tomentose on both sides; heads narrow, numerous, in a fastigiate corymb at the ends of the branches; bracts of the narrow turbinate involucre rather softly strigose-pubescent; rays few, short and inconspicuous; achenes silky-villous; outer series of pappus wanting.

Frequent on dry plains and in the lower portions of the chaparral belt.

8. **SOLIDAGO** Vail. GOLDENROD.

Strict simple-stemmed perennial herbs, with alternate more or less serrate leaves, and many small heads in terminal clusters which are usually in scorpioid racemes and forming a panicle. Involucre narrow, its bracts in 2 or more series, neither herbaceous-tipped nor glutinous. Flowers all permanently yellow, the outer and ligulate shorter, the inner narrow-funnelform. Style-appendages lanceolate. Achenes terete or prismatic, 5-10-nerved, glabrous or pubescent. Pappus a series of unequal scabrous permanently white bristles.

1. **S. confinis** Gray. Glabrous, or the inflorescence sometimes minutely pubescent, 4-9 dm. high; leaves lanceolate, the stem leaves shorter, about 5-8 cm. long, the basal often oblanceolate or obovate, heads about 4 mm. long, crowded in a dense oblong panicle, not secund; rays not surpassing the disk-flowers; achenes canescently pubescent.

Occasional in low marshy places. Cienega; San Bernardino. July-October.

2. **S. californica** Nutt. Roughish with an almost cinereous short pubescence, 6-9 dm. high; leaves larger and more numerous below, passing from obovate to oblong-lanceolate, and from obtuse to acute, the lower and broader more or less serrate; panicle virgate, rather loose, the racemiform clusters secund; heads 6 mm. high; bracts lanceolate-oblong or oblong-linear, obtusish; rays 7-12; achenes pubescent.

Frequent in open places in the lower portions of the chaparral belt in the San Gabriel and Santa Ana Ranges. June-October.

9. **EUTHAMIA** Cass.

Erect glabrous perennial very leafy more or less distinctly corymbose branched herbs, with narrow entire pellucid-punctate leaves, and small heads clustered at the ends of the branches. Involucral bracts firm, imbricated, glutinous. Ray-flowers about twice as many as disk-flowers, all permanently yellow. Achenes short, turbinate, villous-pubescent.

1. **E. occidentalis** Nutt. Somewhat paniculately branching, 1-2 m. high; leaves lanceolate-linear, obscurely 3-nerved; involucral

bracts linear-lanceolate, acute; rays 16–30; disk-flowers 8–14, their style-tips obtuse.

Frequent in low ground and along streams in our valleys and foothills. August–November.

10. ERICAMERIA Nutt.

Low evergreen shrubs with mostly narrow subterete punctate leaves and terminal cymose or corymbose clusters of small heads. Involucre turbinate, its bracts mostly lanceolate, very regularly imbricated, margins subscarious. Flowers permanently yellow. Disk-flowers slender with subcampanulate throat and deeply cleft limb. Style-appendages filiform, acuminate, hirsutulous. Achenes more or less distinctly prismatic. Pappus of scabrous slender bristles, dull-white or yellowish, becoming reddish.

Leaves flat, not filiform.

Leaves linear-lanceolate; erect shrub.

1. *E. parishii*.

Leaves obovate or oblanceolate; low spreading shrub.

2. *E. cuneata*.

Leaves filiform.

Achenes glabrous.

3. *E. ericoides*.

Achenes pubescent.

Outer involucral bracts obtuse.

4. *E. palmeri*.

Outer involucral bracts acuminate.

5. *E. pinifolia*.

1. *E. parishii* (Greene) Hall. Arborescent, 2–4 m. high; leaves lanceolate, 3–5 cm. long, 6–10 mm. wide, acute, subcoriaceous, strongly punctate, glutinous; heads numerous in crowded corymbs, terminating the erect branches, small, 10–12-flowered; involucre turbinate; the bracts few, irregularly imbricated, lanceolate, acute, with a green midrib; achenes turbinate, minutely silky. (*Bigelovia parishii* Greene.)

Occasional in the lower portions of the chaparral belt of the San Gabriel, San Bernardino and Santa Ana Ranges. August–October.

2. *E. cuneata* (Gray) Greene. Freely branching and spreading, about 3 dm. high; leaves coriaceous, cuneate-obovate or spatulate-obovate, often retuse, 10–14 mm. long, resinous-punctate, glutinous; heads about 12 mm. high, in a terminal fasciculate corymb; bracts lanceolate or linear, obtusish; rays 1–5 or none; achenes pubescent. (*Aplopappus cuneatus* Gray.)

On rocky ledges in the San Gabriel and San Bernardino Mountains.

3. *E. ericoides* (Less.) Jepson. Diffusely branching, 8 dm. high or less, the branches fastigate-corymbose, very leafy throughout; leaves linear, terete, those of the branches about 1 cm. long, deflexed, bearing in their axils very short branchlets hidden by 2-ranked closely imbricated shorter ones; involucre turbinate, about

6 mm. high; bracts tomentose-ciliate, all erect, the outer successively shorter, becoming greenish and passing into the very short leaves; rays about 3-5, short; achenes glabrous. (*Ericameria microphylla* Nutt.)

Frequent on bluffs and sand-dunes along the seashore.

4. *E. palmeri* (Gray) Hall. Paniculately much branched, about 1 m. high or less; leaves all filiform terete, those of the branches about 2 cm. long; lower bracts of the involucre greenish-tipped; rays 3-4; achenes pubescent. (*Aplopappus palmeri* Gray.)

Occasional in the foothills about Los Angeles and San Diego.

5. *E. pinifolia* (Gray) Hall. Rather stout, with rigid, erect branches, 15 dm. high or less; stem-leaves filiform, 2.5 cm. long or more, mucronate; heads rather few in a contracted panicle, or scattered, campanulate; proper bracts of the involucre broadly lanceolate and with a greenish midrib, the loose outer ones subulate, shorter than the inner and passing into the small leaves of the flowering branchlets; rays usually 6-10; achenes glabrous or nearly so. (*Aplopappus pinifolius* Gray.)

Frequent in the foothills of the San Gabriel Mountains in the lower altitudes of the chaparral belt. August-November.

11. CHRYSOTHAMNUS Nutt.

Shrubby or suffrutescent plants with narrow or terete entire leaves, and white-tomentose or glabrous herbage often viscid or resinous. Inflorescence paniculate, cymose or rarely racemose. Involucre narrow its bracts well imbricated usually in vertical ranks, chartaceous, with or without herbaceous tips. Ray-flowers none; disk-flowers yellow, 5-30. Style-branches subulate or filiform, long-exserted. Achenes narrow, terete or slightly angled, pubescent; pappus copious, soft, dull white or sometimes reddish.

Branches not tomentose, smooth and white.

Leaves not twisted.

Leaves twisted.

Branches more or less tomentose.

1. *C. stenophyllus*.

2. *C. tortifolius*.

3. *C. occidentalis*.

1. *C. stenophyllus* (Gray) Greene. Shrub with erect branches, 3-10 dm. high; herbage without tomentum, glabrous or slightly scabrous; leaves 2-4 cm. long, 2 mm. wide, acute, mostly 3-nerved, the margins ciliate; flowers cymose; involucre 5-8 mm. high, the bracts 3-4 in each row.

This species is not definitely known within our range, but it has been reported from Acton (*Parish*), and is in the Bear Valley region of the San Bernardino Mountains.

2. *C. tortifolius* (Gray) Greene. Erect shrub 3-10 dm. high, the branches smooth white; herbage destitute of tomentum; leaves

linear or lanceolate, very acute, about 4 mm. wide, 3-nerved, serrulate-scabrous, otherwise glabrous or slightly scabrous, twisted; heads in fastigiate-cymose clusters, about 8 mm. high; involucre bracts 3-4 in each row.

This species is found in southern California only at high altitudes; Mt. Pinos, Mt. San Antonio.

3. *C. occidentalis* Greene. An erect branching shrub, 6-15 dm. high, the flowering branches tomentose, becoming glabrate and yellowish green; leaves narrowly linear, 15-40 mm. long, more or less white-tomentose, sharply acute, 1-nerved; heads numerous in cymose clusters; involucre 8 mm. high; bracts 4 in each row, cuspidate-acute.

A common species especially on the desert slopes of the mountains, but chiefly in the lower edges of the coniferous forest belt; Newhall; *Geis*.

12. *ISOCOMA* Nutt.

Rather rigid tufted erect suffrutescent plants, with thick leaves and a corymbose terminal cluster of rather small rayless heads. Involucre bracts coriaceous, closely imbricated, the tips herbaceous, appressed. Corollas permanently yellow; tube slender; limb ventricose, its segments more or less connivent about the style. Style-appendages ovate or somewhat narrower, pubescent. Achenes short, compressed or subterete, silky-pubescent. Pappus-bristles numerous, unequal, the inner longest and often flattened and awn-like, faintly scabrous.

1. *I. vernonioides* Nutt. Glabrous or commonly loosely pubescent, 6-12 dm. high, erect; leaves oblanceolate, more or less serrate, 2-4 cm. long, often with many fascicled ones in their axils; heads 8 mm. high, campanulate; bracts of the involucre obtusish; pappus-bristles stout, none very perceptibly flattened. (*Bigelovia veneta* Gray.)

Common on dry hillsides and plains. Santa Monica; Los Angeles; Santa Ana Mountains; San Joaquin Hills. July-November.

13. *HAZARDIA* Greene.

Low shrubs or suffrutescent plants, with subcoriaceous more or less persistent toothed or serrate leaves, and spicate or somewhat thyrsoidly congested heads. Involucre oblong or obconic, its numerous bracts in many series, often with squarrose-spreading tips. Heads 20-40-flowered. Rays yellow or none. Disk-corollas narrow, merely 5-toothed, yellow, changing to red or brown. Style-tips linear-subulate. Achenes fusiform, slightly compressed, few-nerved. Pappus reddish.

1. *H. squarrosa* (H. & A.) Greene. Suffrutescent, erect, 6–10 dm. high, glandular and glutinous; leaves oblong, about 2 cm. long, spinulose-dentate; heads many, spicately thyrsoïd toward the summit of the branches, 1 cm. long; bracts of the involucre rigid, appressed, in many series, their tips abruptly spreading; rays none; achenes sparsely pubescent. (*Aplopappus squarrosus* H. & A.)

Occasional on dry hillsides throughout our range. November.

14. LESSINGIA Cham.

More or less floccose-woolly and sometimes glandular annuals, with alternate more or less serrate leaves, and small cymosely paniced heads. Flowers yellow or often whitish or purplish, all perfect. Corollas with slender tube and long narrow lobes, the outer ones more deeply cleft on one side and imitating a palmatifid ligule. Involucre campanulate or turbinate, its bracts much imbricated, appressed, herbaceous tipped. Anthers with slender subulate appendages. Style-appendages obtuse or truncate, densely hispid, often with a setiform cusp among the hairs. Achenes turbinate or cuneiform, silky-villous. Pappus-bristles rigid, scabrous, red or brownish.

1. *L. glandulifera* Gray. Stems diffusely branched from a short erect stem, 1.5–2.5 dm. long, glabrous or glabrate above; basal leaves oblanceolate, pinnatifid, the lower stem leaves spinulose-dentate, those of the branches 5 mm. long or less, thick and rigid, ovate-lanceolate or oblong, the margins commonly beset with yellowish tack-shaped glands; involucre campanulate or turbinate, its bracts appressed, some or all glanduliferous; flowers yellow.

Common on the dry interior plains of our region. June–September.

15. CORETHROGYNE DC.

Perennial herbs covered with a white woolly tomentum at least when young. Inflorescence glandular. Leaves alternate entire or serrate, heads middle-sized, solitary, corymbose or paniced. Involucre hemispheric to turbinate, its bracts much imbricated, scarious except the herbaceous tips. Receptacle pitted. Ray-flowers sterile. Anthers appendaged at the apex. Style-appendages comose or with a bearded tuft.

1. *C. virgata* Benth. Stems erect, often 1 m. high; herbage floccose-woolly; leaves narrowly obovate to oblanceolate, serrate-toothed above; inflorescence a large virgate panicle, viscid with short-stalked glands, usually bearing many heads; involucre turbi-

nate-campanulate, 10-12 mm. broad; bracts rather broadly linear, their tips usually somewhat reflexed.

Common in sandy soil near the coast. June-August.

2. *C. virgata bernardina* Abrams. Stems erect or ascending, 6-8 dm. high; herbage densely floccose-woolly; leaves oblanceolate or oblong, serrate-toothed above; inflorescence somewhat virgate-branched; heads not numerous, only the involucre and the uppermost portion of the peduncles glandular; involucre turbinate-campanulate, 6-8 mm. broad; bracts narrowly linear, their tips somewhat recurved.

Common on the dry plains of the interior valleys, especially in the San Bernardino Valley. The type of this variety is the author's no. 2931, collected at Mentone.

16. ASTER L.

Leafy stemmed autumnal perennial or rarely annual herbs with alternate leaves and paniced or somewhat corymbose heads. Involucre hemispheric to campanulate, its bracts imbricated in several series, tips herbaceous. Ray-flowers many, commonly bluish or pinkish, pistillate. Disk-flowers perfect, yellow changing to red-purple; corolla-tube slender; limb funnelform. Style-branches flattened, their appendages subulate, lanceolate or ovate, acute. Pappus-bristles slender, numerous, scabrous, usually in 1 series, dull white.

Perennials.

Involucral bracts closely imbricated,
with broad green tips.

Foothill and valley species, 4 dm.
high or more.

Herbage rough-pubescent.

Herbage soft-pubescent.

Mountain species, about 3 dm. high.

Involucral bracts not closely imbricated,
narrowed above to a point.

Leaves ovate-oblong to broadly
oblanceolate.

Leaves narrowly lanceolate.

Annual.

1. *A. menziesii*.

2. *A. bernardinus*.

3. *A. fremonti parishii*.

3. *A. greatae*.

4. *A. hesperius*.

5. *A. exilis*.

1. *A. menziesii* Lindl. Strictly erect, about 4-6 dm. high, usually simple and very leafy up to the mostly simply racemose or racemose-paniculate inflorescence, the whole plant cinereously and roughly pubescent; leaves oblong-lanceolate, acute, 5-7.5 cm. long, remotely and faintly serrate; heads numerous in an ample cymose panicle; involucre nearly hemispheric, about 6 mm. high; bracts in rather few series, spatulate-linear, very obtuse, wholly green-herbaceous; rays dull pale purplish.

Occasional on dry wooded hills about Los Angeles and eastward.

2. **A. bernardinus** Hall. Stems several from a perennial base, erect, leafy throughout; herbage cinereous with a dense short soft pubescence; leaves loosely spreading, linear to linear-lanceolate, 3-5 cm. long, 3-5 mm. wide; heads racemose or paniculate; peduncles with linear overlapping bracts; involucre 7 mm. high, canescent; bracts closely imbricated, green and obtuse at apex; ray-flowers 30-35, 6-10 mm. broad, deep blue; achenes canescent.

Moist meadows about San Bernardino, *Parish*; Cienaga, *Braunton*, *Davidson*; Pomona, *Davy*, according to Hall.

3. **A. fremonti parishii** Gray. Stems slender, seldom over 3 dm. high, sometimes simple, and with a solitary terminal flower, commonly with a short cymose panicle; herbage sparsely pubescent or more distinctly so in the inflorescence; basal leaves oblanceolate to obovate, upper leaves linear to narrowly oblong, sessile 4-8 cm. long; involucre 5-8 mm. high, bracts ciliate; rays numerous, about 6 mm. long, blue to violet.

Mountain meadows and streams mostly above 5000 feet, San Bernardino Mountains, also reported from the San Gabriel Mountains (*Davidson*).

4. **A. hesperius** Gray. Stems paniculately branched, 6-10 dm. high, varying from nearly glabrous to scabrous-pubescent; leaves lanceolate, entire or the larger with a few denticulations, 5-10 cm. long, 6-15 mm. wide; heads crowded, 8-10 mm. high; involucre of narrowly linear or more attenuate acute or gradually acuminate erect bracts, either unequal and imbricated or with some loose and slender herbaceous exterior ones which equal the inner; rays either white or violet, 6-8 mm. long.

Cienega, near Los Angeles, and in low ground about San Bernardino.

5. **A. greatae** Parish. Stems erect or assurgent, 4-17 dm. high, glabrous or above sparsely hirtellous; leaves thin, ovate, oblong-lanceolate or lanceolate, 6-15 cm. long, the scabrid margins few-toothed or entire, the base clasping; the uppermost usually reduced to linear or linear-lanceolate bracts; heads 5 mm. high, in an ample panicle; involucre bracts loosely imbricated in a few series, lanceolate, green, minutely ciliate; rays 30-40, light purple, narrow, acute, 5-10 mm. long; achenes hirsute.

Occasional in the canyons of the San Gabriel Mountains, mostly in the upper portions of the chaparral belt.

6. **A. exilis** Ell. Stem erect, 6-12 dm. high, rather stout below, paniculately branched above into numerous slender branches; lower leaves lanceolate, the upper linear, mostly entire; heads small, numerous, about 6 mm. high, narrow; bracts of the involucre linear-subulate; rays 15-40, bluish-purple or pinkish.

Frequent in low subsaline places, especially along the coast. August-October.

17. ERIGERON L.

Branching or scapose herbs, with alternate or basal leaves and corymbose, paniculate or solitary heads of

both tubular and radiate flowers. Involucre hemispheric or campanulate, its bracts narrow, nearly equal, usually imbricated in but 1 or 2 series. Receptacle nearly flat, usually naked. Ray-flowers purplish or whitish, pistillate. Disk-flowers yellow, tubular, perfect, 5-lobed. Style-appendages short, mostly rounded or obtuse. Achenes flattened, mostly 2-nerved. Pappus-bristles scabrous, in 1 series or with an outer shorter series.

Rays 30–40, purple; leaves not soft-pubescent.

Leaves narrowly oblanceolate, 4 mm. wide or more.

1. *E. foliosus*.

Leaves linear-filiform, less than 2 mm. wide.

2. *E. fragilis*.

Rays 100 or more; leaves more or less soft-pubescent.

Plants corymbosely branched above; leaves serrate or coarsely toothed.

3. *E. philadelphus*.

Plants diffusely branched from the base; at least the stem leaves entire.

4. *E. divergens*.

1. *E. foliosus* Nutt. Scabrous and somewhat strigose-pubescent, 4–8 dm. high, leafy throughout; leaves narrowly oblanceolate, entire, about 4 mm. broad, 3–6 cm. long, those of the branches reduced; heads hemispheric, 12–14 mm. broad; rays about 30, narrow, purple; achenes with a few coarse bristly short hairs.

Frequent in sandy soil toward the coast.

2. *E. fragilis* Greene. Stems erect, rigid, 5–7 dm. high, minutely scabrous, leafy; leaves linear-filiform, 3–5 cm. long, rigid, rough with minute incurved hairs; heads usually 10–15, arranged in a loose corymbose panicle on spreading branches; involucre campanulate, its bracts in about 3 series; rays 30–40, very narrow, deep violet; achenes nearly glabrous.

Frequent on the dry plains and foothills away from the coast.

3. *E. philadelphicus* L. Perennial by stolons, soft-pubescent or sometimes nearly glabrous; stems slender, mostly branched above, 3–6 dm. high; lower leaves spatulate or obovate, obtuse, dentate, 2.5–7 cm. long, narrowed into a short petiole; upper leaves clasping, often cordate at base, entire or dentate; heads several or many, corymbose-paniculate, 1–2 cm. broad; peduncles slender, thickened at the summit; involucre depressed hemispheric; its bracts linear, usually scarious-margined; rays 100–150, 4–8 mm. long, light rose-purple; pappus simple; achenes puberulent.

Occasional in low moist ground.

4. *E. divergens* Torr. & Gray. Stems usually many from an annual or biennial taproot, often decumbent at base; herbage cinereous with a short hispid pubescence; basal leaves narrowly spatulate, usually entire, the upper linear, 1–2 cm. long; heads solitary, terminating slender peduncles; rays about 100, filiform, pale purple or nearly white; inner pappus of scanty slender bristles, the outer much shorter, subulate.

Widely distributed over western North America; found on the edge of our limits in Swartout Canyon, San Gabriel Mountains, according to Hall. Common in the San Bernardino Mountains.

18. LEPTILON Raf.

Annual or biennial herbs with small racemose or paniced heads of white flowers. Involucre mostly campanulate, its narrow bracts in 2 or 3 series. Rays small, usually shorter than the diameter of the disk, pistillate, or none. Disk-flowers perfect, usually 4-toothed or 4-lobed. Style-branches short. Achenes flattened. Pappus-bristles in 1 series.

1. *L. canadense* (L.) Britton. Stem hispid-pubescent or glabrate, 2 m. high or less, paniculate, much branched; leaves usually pubescent or ciliate, the lower spatulate, dentate or entire, 5-10 cm. long, the upper linear and mainly entire; heads very numerous, about 4 mm. broad; involucre 2-3 mm. high; its bracts linear, acute, glabrate, the outer shorter; rays numerous, white, shorter than the pappus and mostly shorter than their tubes. (*Erigeron canadense* L.)

A common weed in waste places and cultivated fields.

2. *L. linifolium* (Willd.) Small. Annual or biennial; stems erect, 2-7 dm. high; herbage hispid and scabrous; leaves narrowly spatulate to linear, entire or the lower somewhat toothed; heads in a loose panicle, 4-5 mm. high; involucre bracts linear-subulate, pubescent; ray-flowers minute, white. (*Erigeron linifolus* Willd.)

Introduced from the tropics, first collected within the State at San Diego by Miss Stokes in 1895. Now a fairly common wayside weed about Alhambra, Pasadena and San Bernardino.

19. CONYZA L.

Ours a viscid pubescent branching annual, with alternate leaves, and small many-flowered heads in a crowded thyrsoid leafy panicle. Involucre campanulate, its bracts narrow, appendiculate, in 2-3 series. Pistillate flowers much more numerous than the hermaphrodite, their filiform or slender corollas shorter than the disk and style, truncate or 2-4-toothed. Achenes small, compressed. Pappus a single series of soft capillary bristles, sometimes with an outer series of shorter ones.

1. *C. coulteri* Gray. Stems simple below, branching above, about 1 m. high or less, viscid-pubescent or hirsute, with many-jointed hairs; stem-leaves linear-oblong, the lower spatulate-oblong and with partly clasping base, dentate to lacinate-pinnatifid, 2.5-5 cm. long; involucre 2-4 mm. high, hirsute with soft spreading hairs; flowers whitish; corolla-tube of pistillate flowers truncate, half the

length of the style; hermaphrodite flowers only 5-7; achenes nearly glabrous; pappus bristles several, scabrous.

Occasional in subsaline places. July-September.

20. BACCHARIS L.

Diœcious perennial herbs or shrubs, with alternate leaves and small paniculate or corymbose heads of tubular flowers. Involucre of scale-like imbricated bracts. Receptacle flat, naked. Corolla of the pistillate flowers slender, truncate or minutely toothed, that of the staminate tubular, 5-lobed. Style-branches of the fertile flowers smooth, exserted, those of the sterile flowers rudimentary, tipped with an ovate pubescent appendage. Achenes more or less compressed, ribbed. Pappus of the pistillate flowers copious, capillary, very fine and soft, becoming elongated in fruit, that of the staminate flowers shorter.

Achenes 10-nerved; shrubs.

Ultimate leaves obovate obtuse.

1. *B. pilularis*.

Ultimate leaves linear-oblong, becoming sparse on the rather naked panicle.

2. *B. emoryi*.

Achenes 4-5-nerved.

Leaves glabrous and more or less glutinous.

Shrubs with willow-like leaves.

3. *B. viminea*.

Herb; leaves lanceolate.

4. *B. douglasii*.

Leaves pubescent.

5. *B. plummerae*.

1. **B. pilularis** DC. Compactly branched evergreen shrub, 2-4 m. high or lower and depressed when growing along the sea-shore; branchlets angular from the leaf-bases; leaves subcoriaceous, glutinous, 2 cm. long or less, cuneate-obovate, coarsely toothed or some entire; involucre nearly hemispheric, 4 mm. long, its bracts oval or oblong, all but the innermost very obtuse; flowers white; fertile pappus not over 8 mm. long.

Near Santa Monica, *Davidson*.

2. **B. emoryi** Gray. Erect with slender branches, 1-5 m. high; leaves mostly oblong, or the lower broader, with attenuate or cuneate base and the larger somewhat petioled, more or less 3-nerved, often 2-4-toothed, pale; those of the branches oblanceolate-linear, mostly entire, 1-nerved; involucre campanulate or oblong, 6-8 mm. long; bracts firm-coriaceous, the outermost oval obtusish, the innermost thin, bearded toward the tip; pappus of the pistillate 12 mm. long in fruit.

In low ground toward the coast. Redondo; San Pedro; Santa Ana; San Bernardino.

3. **B. viminea** DC. Shrubby and willow-like, producing short lateral flowering branches, these terete and minutely striate; leaves

narrowly lanceolate, entire or sparingly denticulate, obscurely 3-nerved, 5–7 cm. long; involucre about 8 mm. high, hemispheric, in small cymose clusters, the bracts tawny, destitute of green center or costa.

Very common along all streams throughout our range. April–July. *B. glutinosa* Pers., a similar species, with smaller involucre (5–6 mm. long) and stramineous bracts, is the common species in Imperial Valley, and has been reported from the Los Angeles region, but I have seen no specimens [not referable to *viminea*].

4. *B. douglasii* DC. Glabrous and somewhat glutinous; stems herbaceous nearly or quite to the ground, erect, 12 dm. high or less, simple up to the terminal corymb; leaves glutinous, ovate-lanceolate, either entire or serrulate, 3-nerved from near the base, 7–14 cm. long; heads about 6 mm. high; involucre bracts erose-ciliate, thin and pale with a greenish center; pappus of pistillate flowers scarious, 4 mm. long, soft, of staminate clavellate and barbellate at the summit.

Occasional along streams in our coast region. Ballona Creek; Los Angeles River. August–October.

5. *B. plummerae* Gray. Loosely pubescent throughout, not at all glutinous; stems herbaceous from a woody base, 6–12 dm. high, somewhat branched; leaves linear-oblong, obtuse, irregularly and acutely serrate, 5 cm. long or less, obscurely 3-nerved; heads 8 mm. long; involucre bracts linear; achenes somewhat compressed, puberulent, obscurely 5-nerved; pappus in fruit 8 mm. long.

Santa Ynez Mountains southward to the South Monica Mountains; Topango Canyon, *Davidson*.

Tribe 3. INULEAE. EVERLASTING TRIBE.

Annual or perennial mostly white-woolly plants, with alternate or opposite leaves and small dioecious heads. Involucre bracts often white or scarious, imbricated. Pistillate flowers mostly white, with filiform corollas. Anthers caudate at base, unappendaged at apex. Pappus capillary or none.

Involucre bracts many; receptacle naked.

Bracts dry, but not scarious.

21. PLUCHEA.

Bracts scarious.

26. GNAPHALIUM.

Involucre bracts few or none; receptacle chaffy.

Bracts completely enclosing their achenes; pappus none.

Achenes gibbous.

22. MICROPUS.

Achenes straight or somewhat curved.

Receptacle columnar.

23. STYLOCLINE.

Receptacle globose or ovoid.

24. PSILOCARPUS.

Bracts of 2 kinds, the lower completely enclosing their achenes; the others chaff-like, surrounding a central cluster of flowers.

25. FILAGO.

21. **PLUCHEA** Cass.

Herbs or shrubs with alternate leaves and small heads of tubular flowers in terminal cymose clusters. Involucral bracts imbricated in several series, appressed, herbaceous. Receptacle flat. Outer flowers of the head pistillate, their corollas filiform, 3-cleft or dentate. Central flowers perfect, but mostly sterile, their corollas 5-cleft. Achenes small, 4-5-angled or sulcate. Pappus a series of capillary scabrous bristles.

1. *P. sericea* (Nutt.) Coville. (ARROWWOOD.) Shrub, 4 m. high or less, with suberect slender willowy branches, very leafy up to the cymose clusters of rather small heads; leaves silky-pubescent, 2.5-5 cm. long, linear-lanceolate, acute at both ends, entire; involucre campanulate; outer bracts ovate, obtuse, tomentose; inner ones narrowly linear, deciduous; flowers whitish, tinged with purple or red; pappus copious, the bristles of the sterile flowers clavellate-dilated, of the fertile slender. (*P. borealis* Gray.)

Rather common along the streams, especially in the interior valleys. May-July.

2. *P. camphorata* DC. Annual, stoutish, minutely and somewhat viscid-pubescent, leafy, 6 dm. high; leaves oblong-ovate to oblong-lanceolate, acute at both ends, toothed or denticulate, the larger 7-12 cm. long, petioled; heads short-pedicelled, dull purple, crowded in a corymbose cluster; bracts ovate to lanceolate, often colored.

Occasional along streams and marshes about Los Angeles; Ballona Creek.

22. **MICROPUS** L.

Low floccose annuals with alternate entire leaves and several-flowered scattered heads. Pistillate flowers in 1 or 2 series on a small receptacle, each enclosed in a conduplicate bract which has a scarious appendiculate lip. Hermaphrodite sterile flowers central, few, mostly naked. Involucre outside of the fruiting bracts scanty and scarious. Achenes gibbous, obovate, each enclosed in its bract and falling away with it. Pappus none.

1. *M. californicus* F. & M. Slender, erect, 1-3 dm. high; leaves mostly linear; fructiferous bracts 5-6, becoming firm-coriaceous, somewhat semicordate or semiobovate in outline, straight anteriorly, the soon erect bract-like tip mostly scarious.

Frequent on open hillsides in the Santa Monica Mountains and in the foothills about Los Angeles.

23. **STYLOCLINE** Nutt.

Low and diffuse white-woolly annuals, with alternate leaves and terminal subglobose heads. Bracts of the

involucre and of the receptacle deciduous with the mature fruit, those of the fertile flowers involute or saccate-conduplicate, embracing the obovate or oblong obcompressed achene; those of the sterile flowers plane or concave. Pappus wanting in the fertile flowers, composed of a few caducous bristles in the sterile ones.

1. *S. gnaphalioides* Nutt. Stems 5–10 cm. long; leaves linear or the upper oblong, obtuse; fruiting bract hyaline, broadly ovate, woolly on the back.

Occasional in open ground, on wooded slopes, and in the chaparral belt. April–June.

24. *PSILOCARPHUS* Nutt.

Small, usually depressed and much branched floccose annuals, with opposite leaves and globose heads which are sessile in the axils or at the forks. Fruiting bracts numerous, crowded on the globular or oval receptacle, cucullate-saccate, semiobovate or semiobcordate, rounded at the tip, somewhat membranaceous, apex introrse, the ovate or oblong hyaline appendage inflexed or erect. Achene loose within the bract, oblong or narrow, straight, slightly compressed.

1. *P. globiferus* Nutt. Branched from the base and spreading or prostrate; leaves linear or narrowly spatulate, the uppermost little surpassing the very woolly heads; achenes obovate-oblong, about 1 mm. long.

Frequent on the plains and hills, especially in exsiccated places. April–May.

2. *P. tenellus* Nutt. Simple or much branched and forming mats; herbage with appressed wool; heads numerous, 2–4 mm. in diameter; floral leaves often 2 cm. long, linear-spatulate, mucronate.

Glendale, *Braunton*; Santa Catalina Island, *Blanche Trask*; first collected at Santa Barbara by Nuttall. This species is distinguished from *P. globiferus* by the short closely appressed wool instead of very loose almost arachnoid wool, and by the more numerous and smaller heads.

25. *FILAGO* L.

Erect slender floccose-woolly annuals with alternate entire leaves and small discoid heads in capitate lateral and terminal clusters. Bracts of the involucre few and scarious. Receptacle convex or subconic, chaffy, each chaff-scale subtending an achene. Outer flowers of the heads in several series, pistillate, their corollas filiform, minutely 2–4-dentate. Central flowers few, perfect, but mainly sterile, their corollas tubular, 4–5-toothed. Achenes terete or slightly compressed.

1. *F. californica* Nutt. Slender, erect, annual, 2 dm. high or usually less; leaves linear or the lowest spatulate; heads ovate, slightly angular; pistillate flowers 8-10-bracteate, their bracts broadly ovate and deeply boat-shaped, somewhat arcuate-incurved, very woolly, with broadish and obtuse hyaline tips; inner bracts oblong, concave, nearly glabrous; achenes narrowly oblong, minutely papillose-granular; pappus of the embraced none; of the others copious.

Frequent on dry hillsides and plains, especially in sandy soil. April-June.

26. GNAPHALIUM L. EVERLASTING.

Woolly erect or diffusely branched annual biennial or perennial herbs with alternate leaves and discoid heads of pistillate and perfect flowers. Involucral bracts scarious, white or yellowish, imbricated. Receptacle flat, naked. Pistillate flowers in several series, their corollas filiform, minutely dentate or 3-4-lobed. Central flowers perfect, their corollas tubular, 5-toothed or 5-lobed. Achenes not ribbed. Pappus a single series of scabrous capillary bristles, sometimes thickened above.

Pappus bristles not united at base.

Herbage becoming green in age, more or less glandular and heavy scented.

Annual or biennial; stems herbaceous.

Inflorescence paniculate.

Inflorescence cymose.

Perennial; stems woody below.

Herbage persistently white-woolly throughout, not glandular and heavy scented.

Involucres woolly only at base, the bracts scarious.

Bracts greenish-yellow; heads in close glomerules.

Bracts bright white; heads in loose panicles.

Involucres imbedded in loose wool, the bracts brown.

Pappus bristles united at base, deciduous in a ring.

1. *G. ramosissimum*.

2. *G. californicum*.

3. *G. bicolor*.

4. *G. chilense*.

5. *G. microcephalum*.

6. *G. palustre*.

7. *G. purpureum*.

1. *G. ramosissimum* Nutt. Biennial, erect, 6-15 dm. high, paniculately much branched above the middle; the panicle often rather narrow and virgate; herbage glandular and very sweet-scented, only the stem slightly arachnoid; leaves green on both sides, distinctly decurrent; heads narrow, 4 mm. high, rose color; bracts oblong-lanceolate, acutish.

Occasional on wooded slopes about Pasadena and Los Angeles.

2. *G. californicum* DC. Biennial, 6-10 dm. high, stoutish, corymbosely branched at the summit, bearing rather loose cymosely

disposed clusters of broad heads; leaves lanceolate, glabrate above, glandular and balsamic-scented, strongly adnate-decurrent; heads 5-7 mm. high, nearly as broad, white or yellowish; outer bracts ovate or oblong, the inner acute.

Rather common on the dry plains and foothills. April-July.

3. *G. bicolor* Bioletti. Perennial from a lignescent root; stems several, 4-6 dm. high, strict, mostly simple, very leafy; herbage white with close wool except the under sides of the leaves, these deep green and slightly glandular; stem-leaves narrowly linear, attenuate, acute, erect, short-decurrent at the narrow base, viscid-glandular above; heads in a small close cyme; involucre broadly campanulate, much imbricated, pearly white; bracts ovate and oblong, obtuse.

Occasional in dry washes. Santa Anita Wash, near Monrovia.

4. *G. chilense* Spreng. Stems rather stout, from an annual or biennial root, 3-6 dm. high, loosely floccose or the upper faces of the leaves often nearly glabrous; leaves lanceolate or the lower often spatulate or oblanceolate; heads in close clusters at the ends of the corymbose branches; involucre hemispheric, with a yellowish-green tinge; bracts oval or oblong, obtuse.

Common along the seashore on the sand-dunes and frequent in our foothills and mountains, extending into the pine belt.

5. *G. microcephalum* Nutt. Biennial; stems slender with several erect branches, 5-8 dm. high, loosely corymbose-paniculate above, the whole herbage white with a persistent wool, not at all glandular or heavy-scented; leaves linear or the lower spatulate, slenderly decurrent; heads rather few or loose in the paniculately or cymosely disposed clusters; involucre ovate; bracts white, ovate or oblong, obtuse, except the inner.

Frequent in dry washes and in the chaparral belt. June-September.

6. *G. palustre* Nutt. Low, branching annual, 5-15 cm. high, floccose with long wool; leaves spatulate to oblong and lanceolate; heads glomerate, leafy-bracted; involucre about 2 mm. high, embedded in loose wool; bracts linear, obtuse, brownish-green, the tips white.

Occasional along river bottoms and on the margins of ponds. May-October.

5. *G. purpureum* L. Biennial, simple or branching, erect or decumbent at the base, 2-3 dm. high, canescent with a dense close wool; leaves spatulate, obtuse, usually becoming glabrate and green above; heads crowded in an elongated more or less interrupted spiciform inflorescence; involucre brownish; achenes sparsely scabrous.

Lincoln Park, Davidson.

Tribe 4. AMBROSIAE. RAGWEED TRIBE.

Herbs with mostly alternate leaves and greenish or white unisexual flowers. Staminate heads racemose or

clustered above the few axillary pistillate ones. Pistillate heads usually 2-flowered, destitute of pappus and corolla, completely enclosed by the more or less spiny involucre and becoming a bur in fruit. Staminate flowers many. Receptacle chaffy. Corolla present. Anthers distinct or scarcely coherent.

Involucral bracts of staminate heads united.

Involucres of pistillate heads armed near the apex with a single row of prickles. 27. *AMBROSIA*.

Involucre of pistillate heads armed with several rows of prickles. 28. *GAERTNERIA*.

Involucral bracts of staminate heads distinct. 29. *XANTHIUM*.

27. *AMBROSIA* L. RAGWEED.

Monœcious branching herbs or shrubs, with alternate or opposite, mostly lobed or divided leaves, and small heads of green flowers, the staminate spicate or racemose, the pistillate solitary or clustered in the upper axils. Involucre of the pistillate heads globose-ovoid, closed, 1-flowered, usually armed with 4–8 tubercles or spines; corolla none; pappus none. Involucre of the staminate heads hemispheric, 5–12-lobed, open, many-flowered; corolla funnelform, 5-toothed; anthers scarcely coherent, mucronate-tipped.

1. *A. psilostachya* DC. Stems erect from horizontal root-stocks, 5–8 dm. high, with strigose pubescence and somewhat scabrous; leaves once or twice pinnatifid; fruit mostly solitary in the axils, turgid-ovoid, about 3 mm. long, obtusely short-pointed, rugose-reticulate, either unarmed or with 4 short or sharp tubercles.

A common weed in low ground, especially in coast valleys. June–September.

28. *GAERTNERIA* Med.

Hispid or tomentose branching herbs, sometimes woody at the base, with mostly alternate lobed or divided leaves, and small monœcious greenish heads of discoid flowers, the staminate in terminal spikes or racemes, the pistillate solitary or clustered in the upper axils. Involucre of the pistillate heads ovoid or globose, closed, 1–4-celled, 1–4-beaked, armed with several rows of spines and forming a bur in fruit; corolla none; style-branches exerted; achenes obovoid, thick, solitary in the cells; pappus none. Staminate heads sessile or short-ped-

uncled, their involucre broadly hemispheric, open, 5-12-lobed; receptacle chaffy; corolla regular, with short tube and 5-lobed limb; anthers scarcely coherent, mucronate-tipped.

Spines of the involucre hooked.

1. *G. tenuifolia*.

Spines of the involucre straight.

Annual; inland species.

2. *G. acanthicarpa*.

Perennial; maritime species.

3. *G. bipinnatifida*.

1. *G. tenuifolia* (Gray) Kuntze. Perennial, erect, 4-15 dm. high, leafy throughout, hispid or varying to glabrate; leaves mostly 2-3-pinnately parted or dissected into narrow oblong or linear lobes, the narrow rachis often with a few interposed small lobes, the terminal elongated; staminate racemes elongated and paniculate; pistillate heads in numerous glomerules below, in fruit minutely glandular, about 2 mm. long, armed with 6-18 short and stout incurving spines, their tips usually hooked and with an excavated cartilaginously bordered areola about each. (*Franseria tenuifolia* Gray.)

Rather common about Cahuenga Pass.

2. *G. acanthicarpa* (Hook.) Britton. Annual, diffuse, hirsute or hispid; the stems and branches 3-10 dm. long; leaves ovate or roundish in outline, 2.5-7 cm. broad, bipinnatifid; sterile racemes numerous, short; fruiting involucre 6-8 mm. high, with flat lanceolate-subulate spines. (*Franseria acanthicarpa* Hook.)

Common on the dry plains of the interior valleys. July-September.

3. *G. bipinnatifida* (Nutt.) Kuntze. Perennial, procumbent; stems 6-10 dm. long, hirsute; leaves ovate in outline, 2.5-5 cm. long, 2-3-pinnately parted, with oblong lobes, canescent with soft tomentum or finely hirsute; staminate spikes or racemes dense; fruiting involucre ovate-fusiform, 6-8 mm. long, armed with rather short and thick flattish spines, their acute tips somewhat incurved. (*Franseria bipinnatifida* Nutt.)

Common along the seashore on beach sands and on the sand-dunes. Flowering nearly throughout the year.

29. XANTHIUM L. COCKLE-BUR.

Monœcious annual branching coarse rough or spiny herbs, with alternate lobed or dentate leaves, and rather small heads of greenish flowers, the staminate ones capitate-clustered at the ends of the branches, the pistillate axillary. Involucre of the staminate heads with short distinct bracts in 1-3 series; receptacle chaffy; corolla tubular, 5-toothed; anthers not coherent, mucronate at apex; filaments united. Involucre of pistillate heads ovoid or oblong, closed, covered with hooked spines, 1-2-beaked, 2-celled, each cell containing 1 ovoid or oblong achene; corolla none; pappus none.

1. *X. spinosum* L. Widely branching from the base, about 6 dm. high; leaves ovate-lanceolate, more or less lobed or pinnatifid, glabrate and green above, white-tomentose beneath; axils each with a short-stalked sponged yellow spine about 2 cm. long; burs about 10 mm. long, armed with short weak prickles.

Frequent along roadsides and in waste places. August–October.

2. *X. canadense* Mill. Stems stout, branched above; leaves broad-ovoid, slightly lobed, rough-scabrous; burs about 2 cm. long, densely beset with stoutish hooked prickles and strongly 2-horned at the apex.

Rather common in low ground, especially in sandy soil. July–October.

Tribe 5. HELIANTHEAE. SUNFLOWER TRIBE.

Herbs or somewhat shrubby plants with opposite or basal leaves, and commonly balsamic-resinous juice. Rays present, usually showy. Involucral bracts herbaceous or foliaceous. Receptacle chaffy; chaff subtending each flower. Pappus paleaceous, of rigid awns or cup-like, or rarely of rather stout plumose bristles. Rays usually present.

Rays usually present; pappus paleaceous.

Involucral bracts imbricated in several series.

Rays sterile.

Achenes quadrangular-compressed, glabrous.

30. *HELIANTHUS*.

Achenes flattened, villous, ciliate on the margins.

31. *ENCELIA*.

Rays fertile.

32. *VERBESINA*.

Involucral bracts of 2 dissimilar series.

Rays present, fertile.

33. *LEPTOSYNE*.

Rays sterile or none.

34. *BIDENS*.

Rays wanting; pappus of plumose bristles.

35. *BEBBIA*.

30. *HELIANTHUS* L. SUNFLOWER.

Erect annual or perennial herbs, with opposite or alternate simple leaves, and large peduncled corymbose or solitary heads of both tubular and ray-flowers, the rays yellow, the disk yellow brown or purple. Involucre hemispheric or depressed, its bracts imbricated in several series. Receptacle flat, convex or conic, chaffy, the chaff subtire. Ray-flowers sterile. Disk-flowers perfect, with short tube and 5-lobed limb. Style-branches tipped with hirsute appendages. Achenes thick, oblong or

obovate, compressed or somewhat 4-angled. Pappus of 2 scales or awns, or sometimes with 2-4 additional shorter ones, deciduous.

Annual.

1. *H. annuus*.

Perennials.

Outer bracts exceeding the disk, lanceolate or linear-subulate.

2. *H. parishii*.

Outer bracts not exceeding the disk, ovate, acute.

3. *H. gracilentus*.

1. *H. annuus* L. Robust, hispid or scabrous; stems often 2.5 cm. high, thick, mottled or spotted with purple; leaves all but the lowest alternate, acute or acuminate, more or less regularly dentate or denticulate, 10-25 cm. long, petiolate; involucre bracts broadly ovate to oblong, aristiform-acuminate; disk 2 cm. broad or more, dark purple or brown; rays often 5 cm. long.

A common weed in all the valleys.

2. *H. parishii* Gray. Stems slender, 2-5 m. high, simple or branched above; leaves elongated-lanceolate, softly cinereous-puberulent or canescent beneath, scabrous above; heads 10-15 mm. high; rays 20-35 mm. long; involucre bracts linear-subulate, longer than the disk, villous toward the base; disk-corollas with a silky-villous ring or 2 tufts above the short proper tube; paleæ of the pappus slender-subulate. (*H. oliveri* Gray.)

Oak Knoll, *Grant*; Cienega, *Oliver*; rather frequent in the San Bernardino Valley.

3. *H. gracilentus* Gray. Stems erect and rather strict, 6-12 dm. high, rough-hispidulous or smooth above; leaves short-hispid, the lower ovate lanceolate, 15 cm. long or less, contracted at base to a short margined petiole, the upper narrowly lanceolate to nearly linear and entire; heads terminating the elongated branches of the inflorescence; involucre 7-10 mm. long, shorter than the disk; bracts imbricated, ovate, abruptly or gradually acute, puberulent, the outer usually ciliate; rays 12-16, 20-25 mm. long.

Dry gravelly soils in the foothills of southern California; Newhall, according to Hall; near Claremont, *Baker*.

31. *ENCELIA* Adans.

Herbs or low shrubs with alternate or opposite leaves, and usually with large peduncled heads of both ray- and disk-flowers, the rays neutral, yellow, the disk yellow or brownish, perfect. Receptacle flat, convex or conic, chaffy; chaff usually soft and mainly scarious. Achenes flattened, thin-edged, often villous. Pappus none or an awn or its rudiment to each margin of the wingless achene.

1. *E. californica* Nutt. Woody at base, branched above, 6-12 dm. high, strong-scented, minutely pubescent; leaves ovate to oblong-

lanceolate, rarely denticulate or toothed, about 5 cm. long, green and glabrate; heads commonly solitary, the disk about 2 cm. broad, brownish or purplish; involucre white-villous; rays 16-20, 2.5 cm. long or more, golden-yellow; achenes obovate with very shallow notch and no pappus, the margins very long villous.

Very common in the lower portions of the chaparral belt of all the mountains; also on the low hills about Los Angeles and along the coast. Ranging from Monterey to San Diego. In the San Bernardino and Riverside Valleys and eastward it is replaced by *E. farinosa* Gray, which has the leaves covered with a silvery tomentum.

32. VERBESINA L.

Perennial or annual, pubescent or scabrous herbs with alternate or opposite leaves, often decurrent, and corymbose or solitary heads of both ray- and disk-flowers, or the rays sometimes wanting. Involucral bracts imbricated in few series. Receptacle convex or conic, chaffy, the chaff embracing the disk-flowers. Ray-flowers pistillate or sterile. Disk-flowers perfect, mostly fertile. Achenes flattened or those of the rays 3-sided, their margins winged or wingless. Pappus of 1-3, usually 2, subulate awns, sometimes with 2-3 intermediate scales.

1. *V. encelioides* (Cav.) Gray. Annual; stems densely puberulent, much branched or rarely simple, 3-6 dm. high; leaves deltoid-ovate or deltoid-lanceolate, 5-10 cm. long, coarsely dentate, green and minutely pubescent above, pale and densely canescent beneath, all alternate or the lowest opposite, narrowed at the base to a margined petiole, these often with dilated appendages at the base, heads several or many, 2.5-5 cm. broad; involucral bracts lanceolate, canescent; rays 12-15, golden-yellow, 3-toothed; achenes of the disk-flowers obovate, winged; pappus of 2 subulate awns, those of the rays rugose, thickened, often wingless.

Occasional in moist alluvial soils along our valley streams. Los Angeles; San Fernando Valley. April-June.

33. LEPTOSYNE DC.

Glabrous annual or perennial herbs or rarely shrubby, with dissected leaves, and usually long scapiform erect peduncles, bearing rather large heads of yellow flowers. Involucral bracts in 2 series, the outer of narrow foliaceous spreading bracts, the inner of broad membranous erect ones. Rays broad, pistillate and often fertile, sometimes neutral. Chaff of receptacle linear, thin, scarious, deciduous with the fruit. Achenes flat or somewhat concavo-convex, margined. Pappus a minute callous cup or a pair of paleæ.

1. *L. douglasii* DC. Annual, 3 dm. high; leaves mostly basal, 2-3-parted into filiform divisions; rays 10-15 cm. long; the ring of the disk-corollas distinctly bearded; achenes sparsely beset with capitate rigid bristles, the margin becoming corky; cup-like ring in place of pappus entire.

Common on dry plains and in open places in the lower portions of the chaparral belt. March-May.

2. *L. gigantea* Kell. Perennial; stems stout, fleshy, 6-20 dm. high, bearing at the summit an ample tuft of leaves and stout peduncles of corymbosely arranged heads; leaves 3-pinnately divided into filiform segments; achenes oblong or ovoid, obscurely 3-5-nerved, narrowly callous-winged; pappus a slight coroniform cup.

Bluffs along the sea near Santa Monica. Common on the islands.

34. *BIDENS* L.

Annual or perennial herbs with opposite serrate or usually lobed or dissected leaves, or the upper mostly alternate, and usually rather large heads of both tubular and radiate flowers or the rays none. Involucral bracts in 2 series, distinct or somewhat united at base, the outer often foliaceous and much longer than the inner. Receptacle flat or nearly so, chaffy, the chaff subtending the disk-flowers. Rays when present neutral, usually yellow. Disk-flowers perfect. Achenes flat, quadrangular or nearly terete. Pappus of 2-6 teeth or subulate awns, barbed or hispid.

1. *B. expansa* Greene. Aquatic, perennial by stolons, glabrous throughout; stems erect or ascending, stout, 10-25 dm. high, branched at the nodes; leaves lanceolate, 1-2 dm. long, toothed, narrowed to the connate base; heads on peduncles 4-8 cm. long, erect, nodding in fruit; outer involucral bracts 4-8, foliaceous, reflexed; the inner bracts 8, membranous, acutely oval; rays golden-yellow, ovate-oblong, 2 cm. long; chaff linear, equaling the disk-flowers; achenes black, flat, 5 mm. long; awns 2, 3 mm. long, or with a third half as long, awns and edges of the achene retrorsely barbed.

Frequent in shallow streams about San Bernardino, apparently less common toward the coast. August-November.

2. *B. pilosa* L. Annual; stems erect, usually branched from the base, 4-6 dm. high, glabrous or sparsely pilose-pubescent; leaves pinnate, pilose-pubescent; leaflets 3-5, irregularly serrate or incised, 15-25 mm. long; heads scattered, few, 10-12 mm. broad; rays none; achenes narrow, linear, about 1 cm. long.

Frequent along streets and irrigating ditches. Native of tropical America.

35. *BEBBIA* Greene.

Much branched suffrutescent plants with few mostly opposite narrow leaves, and scattered discoid heads.

Involucre campanulate, its bracts imbricated in 3-4 series, the inner somewhat scarious and striate. Receptacle chaffy; the chaffy bracts persistent, lanceolate, partly embracing the achenes, nearly equaling those of the involucre. Corollas tubular, yellow. Achenes turbinate, slightly obcompressed. Pappus consisting of 1 series of long rather stout plumose bristles.

1. **B. juncea** (Benth.) Greene. Much branched from a woody base, 10-15 dm. high; flowering branches rush-like, nearly leafless, pale green and glabrous or minutely and sparsely scabrous; leaves mainly opposite, linear; heads scattered, terminating the branchlets, 1 cm. high; pappus-bristles equaling the slender corollas; achenes appressed-pubescent.

Occasional in dry washes. Santiago Canyon, Santa Ana Mountains, *Geis*; Highlands.

Tribe 6. MADIEAE. TARWEED TRIBE.

Annual or perennial herbs, with usually glandular viscid or heavy-scented herbage. Leaves alternate or opposite. Involucral bracts in 1 series, each partly or wholly enclosing an achene. Bracts of the receptacle commonly in a single series between ray- and disk-flowers. Rays always present and fertile, destitute of pappus. Disk-flowers sterile or fertile, their pappus paleaceous, awn-like or none.

Ray-achenes laterally compressed, completely enfolded by the involucral bract.

Rays inconspicuous.

Disk-flowers several.

36. **MADIA.**

Disk-flowers 1-4.

41. **HARPAECARPUS.**

Rays showy.

37. **MADARIA.**

Ray-achenes somewhat obcompressed, half enclosed by the bracts.

Leaves spiny; flowers yellow.

38. **CENTROMADIA.**

Leaves not spiny.

Herbage somewhat glandular; flowers yellow.

39. **DEINANDRA.**

Herbage not glandular; flowers white or rose color.

40. **CALYCADENIA.**

Ray-achenes obcompressed or clavate, completely enfolded by their bracts.

Bracts 5; herbage canescent.

42. **LAGOPHYLLA.**

Bracts more than 5.

Rays showy, yellow or white.

43. **LAYIA.**

Rays inconspicuous; pappus becoming showy.

44. **ACHYRACHÆNA.**

36. **MADIA** Mol. TARWEED.

Glandular and viscid heavy-scented herbs with at least the upper leaves alternate, entire or toothed. Heads axillary and terminal. Involucre angled by the salient carinate backs of the uniserial involucre bracts, these usually completely enclosing the ray-achenes, their tips herbaceous. Receptacle flat or convex, bearing a single series of chaff united and forming a cup between the ray- and disk-flowers, the inner portion naked or fimbriate. Ray-flowers yellow, rather short, 3-lobed, fertile. Disk-flowers sterile. Pappus none. Achenes laterally compressed, smooth, beakless.

1. **M. sativa** Mol. Stem simple with a few short ascending branches above, erect, stout, 3-9 dm. high, pubescent with slender hairs and beset with stalked very viscid glands; leaves lanceolate, nearly entire, glandular-pubescent; heads 12 mm. high, short-peduncled or sessile in the upper axils and at the ends of the short branches; cup of receptacle broadly campanulate, enclosing many disk-flowers; disk-achenes cuneate-oblong, 4-angled; ray-achenes falcate-obovate.

Frequent on the plains and grassy hills. July-September.

2. **M. dissitiflora** (Nutt.) T. & G. Slender, loosely branching, 5-7 dm. high, viscid; heads scattered, broad-ovate, about 6 mm. high; cup of receptacle ovoid, not closed; achenes thin, not angular.

On wooded slopes in the Santa Monica Mountains. May-July.

37. **MADARIA** DC.

Erect glandular pilose or somewhat hispid annuals, with lanceolate usually entire leaves, and corymbosely paniced heads of showy yellow flowers. Involucre bracts wholly enclosing the ray-achenes. Receptacle convex, densely fimbriate-hirsute and with a circle of bracts between ray- and disk-flowers. Disk-flowers sterile. Ray-flowers fertile, showy, their achenes laterally compressed, smooth, not incurved. Pappus none.

1. **M. elegans** (Don.) DC. Stems rather stout, 8-15 dm. high; leaves scattered, lanceolate, entire or serrate, sessile by a broad base; whole herbage viscid with stalked glands, the peduncles and involucre hirsute with long white hairs; heads numerous in an ample corymbose panicle; rays 12-15, about 2 cm. long, yellow, often with dark red base; achenes rather thin and flat, dark brown or blackish.

Near Fairmont, *Davidson*; Trabuco Canyon, Santa Ana Mountains. June-September.

38. **CENTROMADIA** Greene.

Rigid corymbosely or diffusely branching annuals, with alternate pinnatifid or entire spinescent leaves. Herbage more or less resiniferous or glandular throughout. Involucral bracts subulate, pungent, half enclosing the ray-achenes, persistent. Ray-flowers 15-40, yellow, small, fertile. Disk-flowers sterile. Receptacle convex. chaffy throughout, the chaff distinct and persistent. Achenes triangular, the inner angles terminated by a short apiculation, nearly smooth or faintly rugose-tuberculate. Pappus none.

1. **C. pungens** (H. & A.) Greene. Stout with rather rigid ascending or spreading branches, 4-8 dm. high, hirsute or hispid, scarcely viscid, nearly or quite scentless; lower leaves 2-pinnatifid, the upper 1-pinnatifid, the lobes pungent-tipped; chaff of receptacle rigid-pungent; disk-achenes destitute of pappus; ray-achenes nearly black, about 2 mm. long, the ventral angle carinate, the plane sides and rounded back faintly tuberculate-rugose.

Common in the plains in heavy, rather moist soil. July-November.

2. **C. parryi** Greene. Widely branching, 3-6 dm. high, sparsely hirsute, minutely resinous-glandular, aromatic; lowest leaves pinnatifid, the cauline linear, entire, sharply pungent, spreading, the uppermost pilose-ciliate toward the base; heads scattered; ray-achenes dull black, 1.5 mm. long, somewhat compressed, smooth on the sides, with a few coarse tuberculations on the back; disk-achenes with 3 or more paleæ exceeding the corollas; chaff of the receptacle not pungent.

brackish flats toward the coast. June-August.

39. **DEINANDRA** Greene.

Erect, rigid and brittle, balsamic-viscid annuals, with mostly small few-flowered paniced heads, and entire or serrate leaves. Involucral bracts few, half enclosing their achenes, their tips short, rigid and erect. Rays usually 5, broad, 3-toothed, diurnal. Receptacle chaffy only next the rays. Ray-achenes gibbous, tuberculate-rugose, the terminal areola raised upon a distinct curved beak from the angle of the ventral face of the achene; disk-achenes mostly sterile, with or without a paleaceous crown.

Heads subsessile, usually fasciculate-clustered.
Heads solitary, terminating the filiform branchlets.

Pappus of the disk-flowers not united.

Pappus of the disk-flowers united to near the summit.

1. *D. fasciculata*.

2. *D. wrightii*.

3. *D. kelloggii*.

1. *D. fasciculata* (DC.) Greene. Hirsute or hispid below, glabrous, and viscid-glandular above, 2-5 dm. high; heads small, subsessile, usually fasciculate-clustered; involucre bracts glabrous or glandular-hispidulous; bracts of the receptacle slightly united; pappus of the disk-achenes of 6-10 linear paleæ. (*Hemizonia fasciculata* T. & G.)

Very common and general on the plains and lower hills. June-September.

2. *D. wrightii* (Gray) Greene. Slender, diffusely and widely branching; the filiform branchlets terminating in a single head; lower leaves laciniate-pinnatifid; pappus of disk-achenes composed of 8-9 firm distinct paleæ, laciniate at apex.

Frequent in the interior valleys beyond our range. San Bernardino; Riverside; Elsinore. It has also been reported from Catalina Island.

3. *D. kelloggii* Greene. Closely resembling the last in habit; heads solitary, terminating the slender paniculate branches; pappus of the tubular flowers united to near the lacerate summit.

Apparently rare in southern California; known only from near Pasadena, where it was recently collected in an old field by Joseph Grinnell.

40. CALYCADENIA DC.

Erect virgate or diffusely branching, more or less hirsute or hispid annuals, with narrowly linear entire leaves, all but the lowest alternate. Floral leaves usually subulate and often ending in a saucer-shaped gland. Receptacle flat, the chaff herbaceous and only enclosing the disk-flowers. Ray-flowers 1-5, white or yellow, vespertine, palmately 3-lobed or parted. Ray-achenes obovoid-triangular, the terminal areola low, nearly central. Disk-achenes turbinate-quadrangular, the outer fertile. Pappus chaffy.

1. *C. tenella* (Nutt.) T. & G. Slender, paniculately diffusely branched above, 1-5 dm. high, sparsely hirsute-pubescent; the filiform branchlets minutely viscid-glandular; leaves almost filiform, the margins involute, destitute of glands; heads scattered; involucre cylindraceous-campanulate; ray-flowers 3-5, 3-parted to the slender tube, white or often tinged with rose; ray-achenes rugose, short-stipitate and abruptly rostellate-apiculate; disk-flowers 5, white, cleft into oblong-linear lobes; their pappus of 4-5 lanceolate paleæ tapering into stout rough awns and as many intermediate short lanceolate truncate ones. (*Hemizonia tenella* Gray.)

Common on dry barren places in our interior valleys and in open places in the chaparral belt. June-August.

41. HARPAECARPUS Nutt.

Small slender viscid-glandular sweet-scented annuals with entire narrow mostly alternate leaves, and numer-

ous pedicellate small few-flowered heads. Ray-flowers fertile, 4–8, minute. Disk-flowers 1–4. Bracts of the receptacle united and forming a cup which encloses the disk-flowers, receptacle otherwise naked. Achenes slender, compressed or obcompressed. Pappus none.

1. *H. exiguus* Gray. Slender, 8–15 cm. high, hirsute, glandular above, paniculately branched; the small heads on long filiform naked peduncles; leaves linear, alternate; involucre bracts 5–8, lunate, almost destitute of free tips, hispid-glandular; cup of receptacle prismatic and very narrow, enclosing a single straight obliquely obovate laterally compressed achene; ray-achenes obovate-lunate, pointed by a small disk.

Frequent on wooded hillsides in open places. May–August.

2. *H. minimus* (Gray) Greene. Stems branching, only about 2.5 cm. high; leaves mostly opposite, the lowest oval or oblong, the others linear, about 6 mm. long; achenes of the ray broadly obcompressed, rounded at the summit, beakless. (*Hemizonia minima* Gray.)

Wilson's Peak, *Davidson*.

42. LAGOPHYLLA Nutt.

Slender, villous or hirsute, rigid and brittle, paniculately branched annuals, with mostly alternate commonly entire leaves, and many small heads of pale salmon-colored or yellow vespertine flowers, subtended by foliaceous bracts. Bracts of the involucre 5, thin, herbaceous, flat on the back, completely enclosing its obcompressed achene and deciduous with it. Rays cuneate, palmately 3-cleft, their achenes obovate-oblong, smooth, nearly straight, pointless. Receptacle flat; chaff a single row of distinct bracts surrounding about 5 perfect but sterile disk-flowers. Pappus none.

1. *L. ramosissima* Nutt. Canescent with a loose silky pubescence, 2–8 dm. high, diffusely paniculate; lowest leaves spatulate-obovate, stem-leaves lanceolate to linear, all entire; heads 6 mm. high, 12 mm. broad, including the expanded rays; achenes 3 mm. long.

Frequent in open places in the foothills and in the chaparral belt of the mountains. May–September.

43. LAYIA Hook & Arn.

Vernal annuals with alternate leaves or the lowest opposite, and usually showy heads of white or yellow flowers terminating the branches. Bracts of the involucre flattened on the back, more or less completely

enfolding their obcompressed achenes. Rays 8-20, 3-lobed; their achenes obovate or narrower, destitute of pappus. Disk-flowers with cylindraceous funnellform 5-lobed corollas; their achenes linear-cuneiform, usually with a pappus of bristles or awns. Receptacle flat, bearing a series of chaffy bracts between the ray- and disk-flowers.

Pappus bristles villous below the middle.

Leaves all entire; rays white.

1. *L. glandulosa*.

Leaves toward the base pinnately toothed; rays yellow.

2. *L. elegans*.

Pappus bristles naked.

3. *L. platyglossa*.

1. *L. glandulosa* (Hook.) H. & A. Diffusely branched from the base or simple, 3 dm. high or less, hispid throughout with spreading hairs and with a few small dark-stalked glands on the uppermost leaves and involucre; leaves all narrow and entire; rays white, about 15 mm. long; pappus bright white, the bristles densely villous below the middle.

Frequent in dry washes in the interior valleys. Big Tejuunga; La Canada; Arroyo Seco.

2. *L. elegans* (Nutt.) Torr. & Gray. Habit of the last but taller, sparsely hirsute and more or less stipitate-glandular throughout; lower leaves pinnately toothed, the upper entire; rays yellow, about 1 cm. long; pappus white, bristles densely villous below the middle.

Frequent on our dry interior plains. San Fernando Valley; Pasadena; Santa Ana Mountains.

3. *L. platyglossa* (F. & M.) Gray. Stems usually about 3 dm. high and sparingly branched, hirsute and stipitate-glandular; lower leaves pinnatifid into linear lobes; rays 10-15 mm. long, yellow with cream-colored tips; disk-achenes silky-hirsute; pappus of 15-20 scabrous tawny bristles.

Frequent in sandy soil, especially along the coast.

44. *ACHYRACHAENA* Schauer.

Soft-pubescent sparingly branched annual, with narrow leaves, all but the lowest alternate, and rather large oblong-campanulate heads terminating pedunculiform branches. Involucral bracts lanceolate, herbaceous, each enfolding a ray-achene. Bracts of the low convex receptacle membranous in a single row between ray- and disk-flowers. Ray-flowers 6-8, very short, 3-cleft; their achenes slightly obcompressed, destitute of pappus. Disk-flowers mostly fertile, clavate, 10-striate, bearing a showy pappus of 10 elongated-oblong obtuse silvery-scarious paleæ.

1. *A. mollis* Schauer. Erect, 2-4 dm. high; leaves linear, entire or serrulate; heads 2.5 cm. long or less in flower; rays very short and involute, yellow, changing to reddish-brown; heads expanded in fruit, forming a globose cluster; pappus becoming very showy.

Occasional in the coast valleys, on grassy plains or in grain fields. Extending south to San Diego.

Tribe 7. HELENIEAE. SNEEZEWEED TRIBE.

Herbs or suffrutescent plants with alternate or opposite leaves. Receptacle naked or with a few fimbriæ. Involucral bracts in 1-2 series or rarely in 3 series. Pappus of paleæ, awns or bristles, or wanting.

Leaves opposite.

Involucral bracts in more than 1 series.

45. JAUMEA.

Involucral bracts in 1 series.

Bracts distinct.

48. BAERIA.

Bracts united into a toothed cup.

49. LASTHENIA.

Leaves alternate.

Rays present.

Rays with toothed appendages opposite the ligules.

50. MONOLOPIA.

Rays unappendaged.

Bracts of the involucre erect.

Herbage pubescent and viscid-glandular.

Bracts equal, in 1-2 series.

47. PERITYLE.

Bracts imbricated, in 2-3 series.

55. HULSEA.

Herbage more or less floccose-woolly.

Perennial or suffrutescent plants.

51. ERIOPHYLLUM.

Low annuals.

52. ACTINOLEPIS.

Outer bracts foliaceous, spreading.

46. VENEGASIA.

Bracts reflexed.

56. HELENIUM.

Rays wanting.

Bracts 5-6; herbage viscid; heads small.

53. AMBLYOPAPPUS.

Bracts more numerous; heads middle-sized.

54. CHAENACTIS.

45. JAUMEA Pers.

Succulent and glabrous perennial herbs, with opposite entire subterete fleshy leaves, and solitary terminal short-peduncled middle-sized heads of yellow flowers. Involucre cylindraceous-campanulate, its bracts broad and imbricated, the outermost short and fleshy. Rays pistillate, fertile. Receptacle naked, conical. Disk-

flowers yellow. Style-branches papillose or hairy. Achenes 10-nerved. Pappus none.

1. *J. carnosa* (Less.) Gray. Stems rather slender, prostrate, many from fleshy crown of the tap-root, mostly simple, 1–2 dm. long, rooting at the nodes; leaves 1.5–2.5 cm. long; heads about 1 cm. high; rays about 6, linear, not surpassing the disk; achenes glabrous.

Common in salt marshes along the coast. April–October.

46. VENEGASIA DC.

Stout perennial leafy branching herbs with scattered large and showy heads of yellow flowers. Involucre hemispheric, broad, the round-ovate bracts imbricated in several series, the outer somewhat foliaceous, the innermost narrow and scarious. Receptacle flat, naked. Ray-flowers many, long, narrow, entire or 3-toothed. Disk-flowers glandular-bearded especially at the base of the tube, 5-angled and many-nerved. Pappus none.

1. *V. carpesioides* DC. Stems widely branching, 1.5 m. high or less, glabrous; leaves thin, ovate-deltoid or ovate-cordate, acute, crenate, 7–10 cm. long, petioled, resinous-dotted beneath; heads terminal and from the upper axils, short-peduncled, about 2 cm. broad; rays about 15, and about 2.5 cm. long.

Frequent in the Santa Monica, San Gabriel and Santa Ana Mountains.

47. PERITYLE Benth.

Mostly annuals with dentate or palmately lobed leaves, all but the lower alternate, and small or middle-sized heads terminating the branches. Involucre hemispheric, its bracts distinct, more or less overlapping, carinate-concave and partly embracing the outer achenes. Receptacle flat or concave. Ray-flowers yellow or white, pistillate or none. Disk-flowers yellow, narrow, 4-toothed. Achenes flat, cartilaginous-margined, usually strongly ciliate. Pappus a squamellate or cupulate crown and commonly a slender awn from one or both of the angles.

1. *P. californica nuda* (Torr.) Gray. Somewhat pubescent and viscid-glandular; leaves roundish-cordate, about 1 cm. broad, incisely lobed, the lobes coarsely dentate; heads narrowly oblong; achenes oblong, densely hispid-villous on the margins; pappus none.

Bluffs along the sea at Santa Monica, *Hasse*.

48. *BAERIA* F. & M.

Low mostly slender annuals, commonly pubescent, with opposite linear entire or laciniate-pinnatifid leaves, and middle-sized heads of yellow flowers on slender peduncles. Involucre campanulate, its bracts usually in 1 series, distinct, usually carinate below. Ray-flowers few or many, often short. Achenes clavate, linear or linear-cuneiform. Pappus of few awns or paleæ or both or rarely none.

Leaves entire, not glandular-pubescent.

Pappus none.

1. *B. chrysostoma*.

Pappus present.

2. *B. gracilis*.

Leaves more or less dissected, more or less glandular-pubescent.

Pappus paleæ, at least some of them, produced into an awn almost equaling the disk-flowers.

3. *B. affinis*.

Pappus paleæ truncate or erose at summit, not produced into awns.

4. *B. mutica*.

1. *B. chrysostoma* F. & M. Stems slender, freely branching, 2 dm. high or less, hirsute-pubescent; leaves narrowly linear, entire; heads 6-8 mm. high; bracts of the involucre 7-12; rays 7-12, 6-8 mm. long; achenes clavate-linear, slightly contracted at the summit, glabrous; pappus none.

Rather common in open places in our coast valleys and foothills. Plaza del Rey; Santa Monica Mountains. April-May.

2. *B. gracilis* (DC.) Gray. Closely resembling the last; stems slender, usually about 1 dm. high; leaves narrowly linear; bracts and rays 10-12 or sometimes less; rays 4-6 mm. long; achenes linear-cuneate, broad at the summit, commonly canescent; pappus of white, lanceolate or ovate, slender, awned paleæ or the paleæ sometimes almost obsolete.

Common on dry hillsides throughout our range. April-May.

3. *B. affinis* (Nutt.) Gray. Erect, sparingly branched, 10-15 cm. high, minutely pubescent, obscurely or not at all glandular; leaves with filiform divisions; rays 6-8, oblong, short; involucre bracts ovate-oval; pappus of 8-10 oblong or lanceolate paleæ with laciniate-setulose margins, fully equaling the corolla-tube, some or most of them produced into an awn almost equaling the disk-flowers, or in the rays blunt and awnless.

Occasional in dry sandy places in interior valleys. Chatsworth Park; Verdugo Hills; Arroyo Seco.

4. *B. mutica* (Nutt.) Gray. Stems slender, erect, branching, 1-2 dm. high, glandular-pubescent; rays 10-15, elongated-oblong; pappus of 6-8 quadrate-oblong paleæ with obtuse or truncate erose summits.

In sandy soil along the coast near Plaza del Rey common about San Diego. April-May.

49. **LASTHENIA** Cass.

Low slender glabrous and usually succulent annuals, with opposite linear or narrowly lanceolate mostly entire leaves, their sessile bases connate around the stem. Heads middle-sized on peduncles terminating the stem and branches, composed of yellow flowers. Involucral bracts a single series connate by their edges into a 5-15-toothed glabrous green cup. Rays usually present. Disk-flowers all fertile, 4-5-lobed. Achenes linear or narrowly oblong, compressed, sometimes slightly 2-3-nerved. Pappus of 5-10 firm subulate-tipped paleæ or none.

1. **L. glabrata coulteri** Gray. Somewhat fleshy, rarely slightly pubescent; stems erect, branching, 2 dm. high or less; peduncles somewhat enlarged under the erect heads; involucre hemispheric; rays 5-10 mm. long; achenes narrowly obovate-oblong, with obtuse edges and with minute scattered rough points or glands.

Common in saline marshes, especially along the coast.

50. **MONOLOPIA** DC.

White-woolly annuals with alternate entire or denticulate leaves and large peduncled heads of yellow flowers. Involucre hemispheric, its bracts united into a cup with broad triangular teeth or distinct to the base. Receptacle conical, naked. Ray-flowers 3-4-toothed, bearing at the base of the ligule an oblong or roundish denticulate appendage. Disk-corollas somewhat hairy on the lobes. Achenes angular, black. Pappus none.

1. **M. major** DC. Stoutish, nearly simple or with several pedunculiform naked monocephalous branches, about 5 dm. high; heads about 3 cm. broad; bracts of the involucre joined into a broad campanulate-toothed cup; achenes 4 mm. long.

Occasional on grassy hills mostly toward the coast, especially on heavy soils. Santa Monica Mountains, north slope; San Pedro Hills.

51. **ERIOPHYLLUM** Lag.

Annual or perennial floccose herbs or suffrutescent plants, with entire or divided alternate leaves, and mostly middle-sized heads of yellow flowers. Involucre oblong to hemispheric, its bracts of firm texture and permanently erect. Rays usually few, short and broad. Disk-flowers with slender tube, commonly glandular and hairy. Style-branches truncate or obtuse. Achenes

clavate-linear to cuneate-oblong, mostly 4-angled. Pappus of firm pointless paleæ.

1. *E. confertiflorum* (DC.) Gray. Stems suffrutescent, 4-6 dm. high, usually branched from the woody base, with a close dense, at length deciduous tomentum; flowering branches leafy; leaves 1-4 cm. long, ternately or pinnately 3-7-parted into narrowly linear divisions; heads many in compact terminal clusters, 3-4 mm. high; involucre obovoid-oblong, its bracts about 5, ovate; rays 4-5, 3-4 mm. long; paleæ 8-10, nearly equal, about half as long as the achene.

Common throughout the lower altitudes of the chaparral belt in all the mountains and hills. March-August.

52. ACTINOLEPIS DC.

Small floccose-woolly simple or freely branching annuals, with small heads of yellow flowers. Involucre obovate or oblong, its bracts few, thinnish, sometimes concave and partly embracing the achenes. Receptacle convex or nearly flat. Ray-flowers few, broad and usually short. Achenes oblong, subclavate and 4-angled. Pappus composed of several scarious or somewhat opaque paleaceous scales.

1. *A. wallacei* Gray. Diffusely branched or, when dwarfed, simple, 4-8 cm. high, densely white-tomentose; leaves alternate, obovate or spatulate, entire; heads short-peduncled; bracts of the involucre about 8, becoming somewhat carinate-concave, with scarious margins embracing the ray-achenes; ray-flowers short and broad, yellow; achenes glabrous; paleæ 10, very short, obtuse.

Dry washes in the interior valleys. La Canada; San Fernando Valley. April-May.

53. AMBLYOPAPPUS H. & A.

Rigidly erect paniced small maritime annual with gummy sweet-scented very bitter herbage, narrow entire alternate leaves, and small discoid heads of yellow flowers. Involucral bracts 5-6, broadly obovate, their middle part becoming somewhat carinate-concave. Receptacle small conical. Corollas all short, tubular, those of the pistillate flowers minutely 2-3-toothed, of the perfect 5-toothed; the teeth soon connivent. Achenes obpyramidal, pubescent. Pappus of 8-12 oblong obtuse paleæ about equaling the corollas.

1. *A. pusillus* H. & A. Somewhat corymbosely much branched, 10-25 cm. high, the lowest leaves pinnately 3-5-parted and opposite, their segments narrowly linear; involucre 4 mm. high.

Occasional on bluffs overhanging the sea. Port Los Angeles; Playa del Rey. June-August.

54. **CHAENACTIS** DC.

Annual herbs, often more or less woolly, with compound leaves and discoid heads mostly solitary and peduncled. Involucre campanulate, the linear bracts equal, uniserial, herbaceous. Receptacle flat, naked. Corollas with short tube, long narrow throat and short teeth, those of the outer row sometimes more ample and resembling rays. Achenes slender, smooth. Pappus of hyaline nerveless paleæ.

Flowers yellow; pappus persistent.

Stems branching near the base, the elongated peduncles scapiform.

Stems branching above, not scapiform.

Flowers not yellow.

Pappus persistent; perennial with a woody base.

Pappus deciduous; tall annual.

1. *C. lanosa*.

2. *C. glabriuscula*.

3. *C. santolinoides*.

4. *C. artemisiaefolia*.

1. *C. lanosa* DC. Stems short, branching near the base, bearing few-many long naked peduncles, 1-2 dm. high, the earlier scapiform; herbage floccose-woolly when young; leaves thickish, simply pinnately-parted into few narrowly linear lobes, or the uppermost entire; heads about 12 mm. high; the outer flowers only moderately enlarged, not surpassing the disk; involucre bracts nearly linear; pappus of 4 equal long paleæ.

Common on plains and foothills, especially in sandy soil.

2. *C. glabriuscula* DC. Taller and more caulescent, branching above, 2-3 dm. high, herbage thinly floccose, becoming glabrate; peduncles long, stout; heads 15-20 mm. high; involucre bracts glabrate, broader, thickish, obtuse; marginal flowers ample, much exceeding the others; pappus of 4 equal narrowly oblong acutish paleæ.

Common on sandy soil or rocky ground in the lower hills and along the coast.

3. *C. santolinoides* Greene. Subcaulescent perennial; leaves all crowded on short tufted shoots from a slightly ligneous crown, white-tomentose, linear in outline with broad rachis, thickly beset with small oblong obtusely few-lobed crispate divisions; peduncles scapiform, 10-15 cm. long, simple or once or twice forked, glandular and viscid; heads 12 mm. high, rather narrow; outer flowers scarcely or not at all enlarged; pappus of 8-10 linear-ligulate paleæ a little shorter than the flowers.

In the higher altitudes of the San Gabriel and San Bernardino Mountains, in open pine woods. June-August.

4. *C. artemisiaefolia* Gray. Stems paniculately branched or nearly simple, 3-8 dm. high, furfuraceous-pubescent, somewhat viscid, above glandular-hirsute; leaves 2-3-pinnately divided or parted into short linear or oblong lobes; heads loosely cymose-

paniculate, about 12–15 mm. high; involucre bracts lanceolate, acute; flowers all alike; achenes clavate, flattened; pappus a small minutely annular disk.

Common in the chaparral belt of all the mountains. April–June.

55. **HULSEA** T. & G.

Viscid or floccose-woolly leafy herbs with alternate entire toothed or pinnatifid leaves, sessile or nearly so, and large solitary or scattered heads. Involucre bracts thin, herbaceous, linear to oblong, in 2–3 series. Receptacle flat. Ray-flowers yellow or purplish. Disk-flowers with long narrow throat and 5 short lobes. Achenes linear-clavate or cuneate-oblong, villous. Pappus of 4–5 hyaline paleæ, either erose or lacerate at the summit or dissected into capillary bristles.

1. **H. heterochroma** Gray. Annual, stout, 6 dm. high or more; leaves oblong, saliently dentate; involucre about 2 cm. high, its bracts linear-lanceolate, attenuate-acute; ray-flowers many, 6–8 mm. long, rose-purple, occasionally reduced or obsolete; paleæ oblong, the 2 over the angles of the achenes longer than the others, the shorter truncate-lacerate.

Occasional in the San Gabriel Mountains in the upper portions of the chaparral belt. Mount Lowe, *Dudley*; Wilson's Peak.

56. **HELENIUM** L. SNEEZEWEED.

Erect perennial resinous-dotted herbs, with alternate leaves sessile except the lowest and often decurrent on the stem. Heads solitary or corymbose, borne on long naked peduncles. Flowers yellow, those of the ray several, usually small and drooping, those of the disk numerous, minute, often brownish. Bracts of the involucre linear, reflexed. Receptacle globose or hemispheric, naked. Achenes turbinate, ribbed, usually more or less pubescent. Pappus of 5–12 thin or hyaline paleæ.

1. **H. puberulum** DC. Puberulent, paniculately branched, 6–12 dm. high, the branches ending in slender peduncles; leaves lanceolate or narrowly linear or the longest oblong, sessile and strongly decurrent on the stem; heads globose, 10–15 mm. broad; ray-flowers and bracts of the involucre reflexed, short and inconspicuous; disk-flowers brownish; pappus-scales ovate, with a short slender awn; achenes about 1 mm. long.

Frequent along mountain streams, especially in the chaparral belt.

Tribe 8. ANTHEMIDEAE. MAYWEED TRIBE.

Strong-scented or aromatic herbs, with alternate, mostly dissected, pinnately parted or pinnatifid leaves. Involucral bracts imbricated, commonly dry and scarious or with scarious margins. Receptacle naked or with chaff-like bracts. Rays present or none. Pappus none or a short scarious crown.

Receptacle chaffy; rays present.

Heads solitary; rays 14–20.

57. ANTHEMIS.

Heads in a terminal corymb; rays 4–5.

58. ACHILLEA.

Receptacle naked; rays none.

Marginal flowers destitute of corollas.

60. COTULA.

Marginal flowers not apetalous.

Heads solitary, terminating leafy branches. 59. MATRICARIA.

Heads small, in paniced racemes or spikes. 61. ARTEMISIA.

57. ANTHEMIS L.

Annual or perennial ill-scented branching herbs, with finely dissected alternate leaves, and radiate heads solitary on terminal peduncles. Involucre hemispheric, its bracts imbricated in several series, scarious-margined, appressed, the outer shorter. Receptacle convex or conical, chaffy at least toward the summit; the chaff subtending the disk-flowers. Ray-flowers pistillate, fertile or neutral, white or yellow. Disk-flowers perfect, yellow, the limb 5-cleft. Achenes oblong, ribbed or striate. Pappus none.

1. *A. cotula* L. (MAYWEED.) Annual, glabrous or sometimes pubescent above, glandular, much branched, 2–6 dm. high; leaves mostly sessile, finely 1–3-pinnately dissected into narrow acute lobes; heads about 2 cm. broad, including the rays; these 10–18, white, neutral, mostly 3-toothed; receptacle conic, its chaff bristly, subtending the central flowers; achenes 10-ribbed, rugose or glandular-tuberculate.

Common in moist places in all the valleys. Native of Europe. April–June.

58. ACHILLEA L. (YARROW, MILFOIL.)

Perennial herbs, with finely dissected leaves, and small heads of both tubular and ligulate flowers corymbose at the ends of the stem and branches. Involucre ovoid or campanulate, its bracts compressed, imbricated in few series. Receptacle flat or convex, chaffy; chaff mem-

branous, subtending the disk-flowers. Ray-flowers white or pink, pistillate. Disk-flowers perfect, fertile, yellow. Achenes oblong or obovate, slightly compressed. Pappus none.

1. *A. lanulosa* Nutt. Pubescent or nearly glabrous, simple or corymbosely branched above, 3–6 dm. high; basal leaves and those of the sterile shoots petioled, those of the stem sessile, all narrowly oblong or lanceolate in outline, finely dissected into narrow pinnatifid segments; heads numerous, 4–6 mm. broad, in terminal compound dense corymbs; rays 4–6, white.

Rather common in the pine belt of the San Gabriel and San Bernardino Mountains.

59. MATRICARIA L.

Annual or perennial herbs with alternate leaves dissected into filiform or narrowly linear segments, and discoid or radiate peduncled heads. Involucre hemispheric, its bracts imbricated in few series. Receptacle conic or elongated, naked. Rays in ours wanting. Disk-flowers yellow, perfect, fertile, 4–5-toothed. Achenes 3–5-ribbed. Pappus a coroniform border or none.

1. *M. matricariodes* (Less.) Porter. Annual, glabrous; stems leafy, becoming much branched, often more or less decumbent, 1–3 dm. high; leaves 2–3-pinnately dissected into linear acute lobes; heads numerous, 6–8 mm. broad; involucre bracts oval or oblong, green with broad white scarious margins, much shorter than the ovoid disk; achenes oblong, faintly nerved; pappus an obscure crown. (*M. discoidea* DC.)

Frequent along roadsides and in waste places. May–July.

60. COTULA L.

Low annual or perennial herbs with alternate lobed or dissected leaves, and slender peduncled discoid short-hemispheric heads. Involucral bracts in about 2 series, greenish. Receptacle naked, flat or nearly so. Marginal flowers pistillate and apetalous. Disk-flowers 4-toothed, fertile or sterile. Achenes pedicellate, compressed, spongy-margined or narrowly winged. Pappus none.

1. *C. coronopifolia* L. Perennial, usually subaquatic, somewhat succulent and glabrous; stems clustered, stoutish, decumbent, 25–30 cm. long; leaves linear-lanceolate, lacinate-pinnatifid or the upper entire, clasping or sheathing at the base; heads much depressed, 8–12 mm. broad; apetalous flowers in 1 row, their achenes with a thick spongy wing; disk-flowers yellow, their achenes with wing reduced.

Common in wet places along streams and marshes, especially toward the coast. Flowering nearly throughout the year.

2. *C. australis* Hook. Annual, slender and diffusely branched, pubescent with soft spreading hairs, not at all succulent, 5–12 cm. long; leaves 1–2-pinnately divided into linear lobes; heads 2–3 mm. broad; involucre bracts brownish-tipped, scarious-margined; apetalous flowers in 2–3 rows, pedicellate, their achenes minutely hispid on both faces, the margins smooth.

In waste places along streets, not common. January–March.

61. ARTEMISIA L.

Mostly aromatic and bitter herbs or shrubs with alternate leaves and paniced spikes or racemes of small discoid heads. Involucre bracts imbricated in few series, the outer gradually shorter. Receptacle flat, convex or hemispheric, naked or pubescent, not chaffy. Marginal flowers pistillate and fertile, their corollas 2–3-toothed. Central flowers perfect, sterile or fertile, or flowers all perfect and fertile. Anthers often tipped at apex with subulate appendages. Achenes obovoid or oblong, 2-ribbed or striate, rounded or truncate at the summit, with a small terminal areola. Pappus none or minute and coroniform.

Perennial or annual herbs.

Leaves densely tomentose beneath.

1. *A. heterophylla*.

Leaves glabrous.

Leaves pinnately parted.

2. *A. biennis*.

Leaves, all but the lowest linear and entire.

3. *A. dracunculoides*.

Shrubs, canescent throughout and strongly aromatic.

Flowers of the margin pistillate, the others perfect.

4. *A. californica*.

Flowers all perfect and fertile.

5. *A. parishii*.

1. *A. heterophylla* Nutt. Perennial; stems erect, somewhat woody at base, 1–2 m. high; leaves lanceolate to oblong, ovate or elliptic, 5–10 cm. long, sparingly pinnatifid, cleft or often entire, green above, white-tomentose beneath; heads mostly erect in dense terminal panicles, the axis leafy; involucre oblong; marginal flowers pistillate; disk-flowers perfect, all fertile. (*A. vulgaris californica* Bess.)

Common in low ground and along streams in the foothills. July–October.

2. *A. biennis* Willd. Annual; stems erect, virgate, 3–10 dm. high, leafy to the summit; herbage deep green, glabrous and nearly tasteless, aromatic; leaves 1–2-pinnately parted into lanceolate or broadly linear lacinate or toothed lobes, or the uppermost only

pinnatifid; heads small, in close glomerules on the spiciform short branches and stems; involucre hemispheric; achenes with small epigynous disk.

Occasional in low moist ground about Los Angeles. Native of Europe.

3. *A. dracunculoides* Pursh. Perennial; stems clustered, herbaceous, 6–12 dm. high, virgately branched, glabrous, pungent-scented when bruised, tasteless; lowest leaves 3-cleft at summit, the others linear, entire; heads numerous, nodding on very slender short peduncles in a close or open panicle, the clusters sometimes secund; involucre hemispheric, about 2 mm. broad; marginal flowers fertile; disk-flowers perfect, sterile.

Frequent in the valleys and foothills throughout our range. August–October.

4. *A. californica* Less. (CALIFORNIA SAGE.) Shrubby, with numerous ascending branches, 6–12 dm. high, aromatic; leaves cinereous with a minute appressed pubescence, the lowest parted into a few linear filiform segments, the upper entire; heads many, nodding in long racemose leafy panicles; involucre hemispheric, about 4 mm. broad; achenes truncate at summit, with a squamellate or coroniform-dentate pappus.

Common on dry hillsides in the lower altitudes of the chaparral belt. September–December.

5. *A. parishii* Gray. Shrub, 1–2 m. high; herbage cinereous-puberulent; leaves linear to linear-cuneate, entire or the upper 3-toothed at apex; panicle loose, 2–3 dm. long; involucre 3.5 mm. high, oblong-campanulate, canescent, 6–7-flowered; achenes sparsely arachnoid-villous.

Common in Antelope Valley and extending through San Antonio Pass to Newhall, where it was first discovered by Parish. This species is closely related to *A. tridentata*.

Tribe 9. SENECTIONEAE. GROUNDSEL TRIBE.

Herbs or suffrutescent plants with alternate or basal leaves. Involucral bracts little or not at all imbricated, mostly in 1–2 series. Receptacle naked. Pappus-bristles soft, commonly copious and usually white.

Shrubby or suffrutescent plants.

Rays wanting.

Bracts imbricated; leaves mostly scale-like.

Bracts in 1 series; herbage woolly.

Rays present.

Herbs; rays present or wanting.

62. LEPIDOSPARTUM.

63. TETRADYMIA.

64. SENECIO.

64. SENECIO.

62. **LEPIDOSPARTUM** Gray.

A low rigid green scaly-bracted almost leafless shrub, somewhat fastigiately branching, and bearing somewhat corymbose or racemosely arranged heads of pale yellow flowers. Involucral bracts of 2 sets, the inner long, linear, 8-12 in 2 or more series, the outer much shorter and imbricated. Receptacle naked. Rays none. Disk-flowers with long tube and lanceolate-linear spreading lobes. Achenes oblong, terete, 8-10-nerved, with large epigynous disk. Pappus copious, of soft white capillary bristles.

1. *L. squamatum* Gray. Branching shrub, broom-like, 6-12 dm. high; young seedlings and shoots floccose-tomentose, and with spatulate entire leaves, becoming glabrous and nearly leafless in age; heads 6-10 mm. high, terminal on the branches.

Frequent in dry washes in all the interior valleys. July-October.

63. **TETRADYMIA** DC.

Low rigid canescently tomentose shrubs with alternate narrow entire leaves and cymose-clustered discoid heads of yellow flowers. Involucre long and narrow, of 4-6 bracts. Corollas with long tube, the narrow spreading lobes longer than the campanulate involucre. Achenes terete, short, 5-nerved, from long-villous to glabrous. Pappus of fine and soft long capillary white or whitish bristles.

1. *T. comosa* Gray. Branches erect, elongated, 4-8 dm. high; primary leaves linear, softly floccose-tomentose, the earlier 5-7 cm. long, and 4 mm. wide, plane; those of the branches often filiform, deciduous, some of the upper changed to long soft spines; heads corymbose or glomerate at the summit of the branches; involucre 5-9-flowered, its bracts 5-6; pappus fine, concealed by the long wool of the achene.

Dry washes of the interior valleys, perhaps not within our region but found as far westward as Cucamonga. July-August.

64. **SENECIO** L.

Annual or perennial herbs or shrubs, with alternate or basal leaves, and solitary corymbose or paniculate many-flowered heads of both tubular and ray-flowers or only tubular, in ours yellow. Involucre cylindric or campanulate, its principal bracts in 1 series, distinct or united at the base, usually with some shorter outer ones. Receptacle flat or somewhat convex, mostly naked.

Rays when present pistillate. Disk-flowers perfect, 5-toothed. Achenes terete or those of the marginal flowers somewhat compressed, 5-10-ribbed, papillose or canescent and usually emitting a pair of spiral threads after wetting. Pappus copious, of white scabrous or smooth capillary bristles.

Annuals, glabrous or nearly so.

Rays none.

1. *S. vulgaris*.

Rays present.

2. *S. californicus*.

Perennial herbs or suffrutescent, more or less floccose-woolly.

Rays none; leaves dentate.

3. *S. astephanus*.

Rays present; leaves at least the lower pinnately parted into narrow lobes.

4. *S. douglasii*.

1. *S. vulgaris* L. Annual, puberulent or glabrate; stems slightly fleshy, 1-3 dm. high, more or less branched; leaves clasping at the base, pinnatifid, the lobes and sinuses sharply toothed; heads 7-9 mm. high; bracts black-tipped; rays none; achenes slightly canescent.

Common in neglected gardens and yards. Flowering throughout the year. Native of Europe.

2. *S. californicus* DC. Annual, glabrous or becoming so, slender 1.5-4 dm. high; leaves lanceolate in outline, varying from denticulate to pinnatifid, the lobes short and obtuse, all but the lowest sessile and auriculate-clasping, 2.5-5 cm. long; involucre 6-8 mm. high, its bracts narrow; rays oblong, 6-8 mm. long, light yellow; achenes canescent.

Common in sandy soil in dry places in our interior valleys and foothills, and on the sand-dunes along the seashore. February-May.

3. *S. astephanus* Greene. Stems erect, from a biennial or perennial root, 5-10 dm. high, very floccose-woolly, at length glabrate above; basal leaves thin, 2-3 dm. high, elliptic-oblong, acute at both ends, coarsely dentate, the teeth spreading, triangular, callous, tipped, the sinuses rounded and the larger denticulate, lower leaves resembling the basal, the uppermost narrow, lanceolate, entire or irregularly dentate; heads 1-2 cm. broad, less than 1 cm. high; 6-10 in a close cluster at the ends of the peduncles; rays none-flowers all fertile. (*S. ilicetorum* Davidson.)

Wilson's trail at 2500 feet altitude, *Davidson*.

4. *S. douglasii* DC. Suffrutescent, usually about 1 m. high, branching from the base, whitish-tomentose or becoming glabrate; lower leaves pinnately divided into about 5 narrowly linear lobes, the uppermost entire, all with revolute margins; heads rather few, corymbose, 10-15 mm. high; rays light yellow, 10 mm. long; achenes hoary with a short pubescence.

Common on dry plains and foothills, mostly below 3000 feet altitude. July-November.

Tribe 10. CYNAREAE. THISTLE TRIBE.

Herbs with alternate prickly leaves and mostly large heads. Involucral bracts imbricated, usually spinescent. Receptacle bristly or hairy. Rays none. Corollas tubular, deeply and narrowly lobed. Anthers caudate at the base and appendaged at the apex. Pappus bristly or plumose, rarely paleaceous.

Filaments distinct.

Pappus bristles plumose, deciduous in a ring.

Pappus in 1 series.

Pappus in several series.

Pappus bristles setose.

Filaments united into a tube.

65. *CIRSIUM*.

66. *CYNARA*.

68. *CENTAUREA*.

67. *SILYBUM*.

65. *CIRSIUM* L. THISTLE.

Erect, branching or simple, prickly herbs, with alternate or basal sinuate dentate lobed or pinnatifid usually spiny leaves, and large many-flowered solitary or clustered discoid heads of crimson, purple or white flowers. Involucre ovoid or globose, its bracts prickly-tipped or unarmed, imbricated in many series. Receptacle flat or convex, bristly. Flowers all tubular, perfect and fertile or rarely dioecious, their corollas slender, with deeply 5-cleft limb. Filaments pilose or rarely glabrous. Achenes obovate or oblong, compressed or obtusely 4-angled, smooth or ribbed. Pappus of several series of slender plumose minutely serrulate or simple bristles, connate at base.

Heads sessile or short-pedunculate, leafy-bracted at base.

Heads solitary on long peduncles, not leafy-bracted at base.

Corolla-lobes longer than the throat, crimson.

Corolla-lobes equaling or shorter than the throat, white to pinkish.

1. *C. edule*.

2. *C. californicum*.

3. *C. occidentale*.

1. *C. edule* Nutt. Stout, 1-2 m. high, pubescent, leafy up to the short panicle; leaves oblong or narrower, sinuate-pinnatifid, weakly prickly; heads 3-4 cm. high, depressed-globose, few in a terminal cluster, leafy-bracted at base; involucre arachnoid when young; flowers deep purple, their segments shorter than the throat.

Pasadena, *Mc Clatchie*.

2. *C. californicum* Gray. Rather slender, 6–12 dm. high, canescently woolly; leaves sinuate-pinnatifid, moderately prickly; heads solitary on long peduncles, about 4 cm. high; involucre somewhat woolly; the lower bracts coriaceous-acerose, spreading and incurved, the others straight, all subulate-spinescent at the tip; flowers lilac-purplish or rose color; lobes shorter than the throat.

Occasional in open places in the Santa Monica, San Gabriel and Santa Ana Mountains. May–July.

3. *C. occidentale* (Nutt.) Jepson. Stout, 6–9 dm. high; leaves deeply pinnatifid, glabrate above, canescently tomentose beneath; heads solitary on stout peduncles; involucre subglobose; bracts straight, subulate-lanceolate, with short spines, densely covered with cobwebby hairs; flowers deep red-purple; lobes longer than the throat.

Common on sandy soil, especially toward the coast. May–July.

66. *CYNARA* L. ARTICHOKE.

Stout perennial prickly herbs, with pinnatifid sessile leaves, their lobes spinescently tipped, and large heads of purple tubular flowers. Involucral bracts well-imbricated, coriaceous, spinescent. Receptacle fleshy, fimbriate. Achenes obovate, compressed and somewhat 4-angled. Pappus of many series of plumose bristles.

1. *C. scolymus* L. Stout and low, with very ample hoary-tomentose bipinnatifid leaves; involucral bracts ovate, obtuse or emarginate.

An occasional escape from gardens. June–July.

67. *SILYBUM* Vaill.

Annual or biennial herbs with ample prickly clasping leaves. Heads very large, solitary at the ends of the branches. Involucral bracts broad appressed, tipped by broadly lanceolate spreading spines. Corolla with filiform tube conspicuously dilated below the narrow lobes. Pappus bristles in several series, barbellate. Filaments united below into a tube.

1. *S. marianum* (L.) Gaertn. (MILK THISTLE.) Stems branching, stout, 1–2 m. high; leaves glabrous, shining above and conspicuously spotted with white blotches along the veins, sinuate-pinnatifid and undulate, the upper merely spinose-toothed; heads 3–5 cm. broad; corolla purple.

Introduced from southern Europe, and becoming rather common as a wayside weed.

68. *CENTAUREA* L.

Annual or perennial herbs, with alternate entire dentate or pinnatifid leaves, and large or middle-sized heads

of variously colored flowers. Involucre ovoid or globose, its bracts imbricated in many series, tipped with a stout spine. Receptacle flat, bristly. Corolla-tube slender, the limb 5-toothed or 5-cleft. Achenes oblong or obovoid, compressed or somewhat 4-angled, obliquely or laterally attached to the receptacle. Pappus of many slender scabrous bristles or scales or rarely none.

1. *C. melitensis* L. (STAR-THISTLE.) Erect, branching, 5-8 dm. high, cinereous-pubescent or when young somewhat woolly; basal leaves lyrate-pinnatifid, those of the stem lanceolate, mostly entire, narrowly decurrent; principal bracts with slender spines of about their own length, spines pectinate-spinulose at base, innermost with spinescent tips; flowers yellow; pappus of very unequal rather rigid bristles or squamellate.

A common weed in waysides and fields. July-November. Native of southern Europe.

Tribe 11. MUTISIEAE. PEREZIA TRIBE.

Ours perennial herbs with subcoriaceous setulose-ciliate alternate leaves. Involucral bracts imbricated. Corollas 2-lipped, the outer lip 3-lobed, the inner 2-lobed. Anthers caudate and with a long appendage at the apex.

Represented with us by the single genus.

69. PEREZIA.

69. PEREZIA Lag.

Perennial herbs with mostly reticulated often setulose-ciliate or spinulose leaves, and solitary cymose or paniculate middle-sized discoid heads of rose-purple white or blue flowers. Involucral bracts imbricated in few-several series, dry, chartaceous or coriaceous. Receptacle flat, naked, rarely pilose or fimbriate. Corollas 5-lobed and somewhat bilabiate. Achenes narrowed at apex. Pappus of copious capillary scabrous rigid or soft bristles.

1. *P. microcephala* Gray. Tall, branching above, 1.5-2 m. high, leafy; leaves oblong, the upper ovate, cordate-clasping, 8-12 cm. long, thin-coriaceous, minutely glandular-scabrous, veiny, closely spinulose-denticulate; heads corymbose at the summits of the paniculate branches, 12-15 mm. high; involucral bracts very acute, coriaceous; flowers 10-15 in a head, their corollas 8-10 mm. long, rose-purple.

Frequent on the dry interior plains and foothills. July-August.

Tribe 12. CICHORIEAE. CHICORY TRIBE.

Herbs with milky juice and alternate or basal leaves and perfect flowers with ligulate corollas. Receptacle naked or chaffy.

Pappus paleaceous.

Paleæ not awned; flowers blue.

70. CICHORIUM.

Paleæ with a slender awn or bristle.

Paleæ cleft at the apex, the bristle or awn proceeding from the cleft.

72. UROPAPPUS.

Paleæ not cleft at the apex.

71. MICROSERIS.

Pappus of rather rigid plumose bristles.

Receptacle chaffy.

73. HYPOCHÆRIS.

Receptacle naked.

Achenes not beaked.

74. PTILORIA.

Achenes, at least the inner, with a slender beak.

Flowers white.

75. NEMOSERIS.

Flowers purple; pappus brownish.

76. TRAGOPOGON.

Pappus of soft capillary scabrous bristles.

Achenes beakless.

Achenes not flattened.

Pappus deciduous, or 1-2 outer bristles persistent.

77. MALACOTHRIX.

Pappus persistent.

Pappus white.

82. CREPIS.

Pappus tawny.

83. HIERACIUM.

Achenes flattened.

79. SONCHUS.

Achenes beaked.

Achenes flattened.

80. LACTUCA.

Achenes not flattened.

Achenes smooth.

81. AGOSERIS.

Achenes spinulose-roughened.

78. LEOTODON.

70. CICHORIUM L.

Erect branching herbs, with alternate and basal leaves, and large heads of usually blue flowers peduncled or in sessile clusters along the branches. Involucral bracts in 2 series, herbaceous, the outer somewhat spreading, the inner erect and subtending or partly enclosing the outer achenes. Receptacle flat, naked or slightly fimbriate. Rays truncate and 5-toothed at the apex. Anthers sagittate at the base. Style-branches slender, obtusish. Achenes 5-angled or 5-ribbed, truncate, beakless. Pappus of 2-3 series of short blunt scales.

1. *C. intybus* L. (CHICORY.) Perennial from a long deep tap-root; stems slightly hispid, stiff, branched, 3-9 dm. high; basal

leaves spreading on the ground, runcinate-pinnatifid, spatulate in outline, 8-16 cm. long, narrowed into long petioles; upper leaves much smaller, lanceolate or oblong, lobed or entire, clasping or auricled at the base; heads numerous, 25-40 mm. broad, 1-4 together in sessile clusters on the nearly naked or bracted branches; flowers bright blue, rarely white.

Occasional in waste places. Hyde Park; Shermans.

71. MICROSERIS Don.

Acaulescent glabrous or slightly puberulent annuals, with basal tufted leaves pinnatifid with mostly linear and often falcate lobes or entire. Heads solitary in long leafless scape-like peduncles, these nodding in bud, becoming erect in fruit. Involucre narrowly oblong to ovoid or subglobose. Ligules short, yellow. Achenes slender-fusiform or cylindric, ribbed, mostly truncate. Pappus paleæ 5, mostly short, abruptly or gradually passing into the scabrous awn.

1. *M. elegans* Greene. Scapes usually decumbent at base, 15-35 cm. high; leaves pinnatifid; involucre broadly ovoid; achenes slender, 3-4 mm. long, oblong-clavate; paleæ ovate, scarcely 1 mm. long; bristles 6-8 mm. long, slender, fragile or deciduous.

Near Santa Monica, *Davidson*.

2. *M. douglasii* (DC.) Gray. Scapes 2-4 dm. high; leaves narrow, 1-2 dm. long; heads about 10 mm. broad; achenes oblong-turbinate, 5 mm. long, the outer ones white-villous; palea of the pappus ovate, 2-3 mm. long, about half the length of the slender persistent bristles. (*M. cyllocarpha* Gray.)

Occasional in open grassy places on the north slope of the Santa Monica Mountains.

72. UROPAPPUS Nutt.

Nearly acaulescent annuals with pinnatifid or entire leaves and solitary heads on scape-like peduncles. Heads erect, oblong. Involucral bracts about equal, with shorter ones at the base, all membranous. Ligules short, yellow. Achenes 10-12-ribbed. Pappus-paleæ 5, elongated, tipped with a very short awn or bristle which proceeds from the cleft summit.

1. *U. linearifolius* (DC.) Nutt. Stems or peduncles usually several from the base, erect, 2-4 dm. high, in robust plants thickened and fistulose under the oblong head; leaves linear, 7-15 cm. long; 2-4 mm. wide, with 2-several pairs of more or less serrate salient attenuate lobes; achenes attenuate above into a beak, 10 mm. long; pappus silvery-white, 12-14 mm. long; the awn delicate, about half the length of the deeply notched palea.

Common on grassy hillsides in the foothills. March-May.

2. *U. lindleyi* (DC.) Nutt. Stout, 2-4 dm. high; peduncles scarcely thickened under the head; leaves as in the last or somewhat broader; achenes brownish, 10 mm. long, slightly narrowed above; pappus dull brown or sordid, 12-14 mm. long; awn nearly equaling the paleæ, from a very shallow notch.

Same range as the last, but not common.

73. HYPOCHAERIS L.

Mostly perennial herbs, with scapose, often branched stems, mostly basal tufted leaves, pinnatifid or entire, and mostly large long-peduncled heads. Involucre oblong-cylindric to campanulate, its bracts herbaceous in several series. Receptacle flat, chaffy. Flowers yellow. Achenes oblong to linear, 10-ribbed, contracted above or the outer truncate. Pappus of 1 row of plumose bristles, sometimes with some shorter simple ones.

1. *H. radicata* L. Perennial; stems several, slender, 3-6 dm. high, branched or rarely simple; leaves spreading on the ground, oblanceolate to obovate, pinnatifid-lobed to dentate, 5-15 cm. long, hirsute; heads 2.5 cm. broad or more; achenes rough, all with slender, long beaks.

Pasadena, *Mc Clatchie*.

2. *H. glabra* L. Scapes several, erect from an annual tap root, 1-5 dm. high; herbage glabrous; leaves broadest above, denticulate to lobed; flowers longer than the involucre; outermost achenes truncate, the others beaked.

A naturalized weed, found in gardens and cultivated fields.

74. PTILORIA Raf.

Annual or perennial, mostly glabrous, often glaucous herbs, with erect simple or branched usually rigid stems, alternate or basal entire or runcinate-pinnatifid leaves, those of the branches often small and scale-like, and small erect heads of usually pink flowers paniculate or solitary at the ends of the branches. Involucre cylindric or oblong, its principal bracts few, equal, scarious-margined, slightly united at the base, with numerous short exterior ones. Flowers pinkish, opening in the morning. Receptacle flat, naked. Anthers sagittate at base. Style-branches slender. Achenes oblong or linear, terete, 5-ribbed, truncate or beaked at summit. Pappus of 1 series of rather rigid plumose bristles.

Herbage glabrous.

Achenes with a deep groove between the ribs. 1. *P. virgata*.

Achenes without a deep groove between the ribs.

2. *P. pleurocarpa*.

Herbage woolly, becoming glabrate.

3. *P. cichoriacea*.

1. *P. virgata* (Benth.) Greene. Stems rigid, 3–10 dm. high, virgate, glabrous throughout and the herbage deep green; leaves runcinate; heads 6–8 mm. high, subsessile along the naked upper part of the stem and branches, 4–8-flowered; achenes subclavate or oblong, ribbed and with as many mostly closed grooves, rugose; pappus white, plumose almost throughout, rather persistent.

Common on dry ground, especially toward the coast. July–September.

2. *P. pleurocarpa* Greene. Taller and stouter than the last, virgate-paniculate, glabrous and glaucous; heads rather small, few-flowered; achenes fusiform, rugose-tuberculate between the salient rib-like angles, intervening grooves wanting; pappus-bristles numerous, distinctly plumose to the base, bright white, soft, early deciduous.

Common in fields and along waysides about Pasadena and eastward to San Bernardino. July–August.

3. *P. cichoriacea* (Gray) Greene. Perennial, 3–8 dm. high, rather stout, tomentulose at least when young; leaves lanceolate, sparsely denticulate to runcinate-laciniate; heads sessile along naked branches; involucre 12 mm. high; mature achenes short-linear, smooth, slightly and acutely 5-angled; pappus sordid, persistent.

Frequent in rocky canyons of the San Gabriel Mountains. July–September.

75. NEMOSERIS Raf.

Glabrous and slightly succulent branching annuals with pinnatifid leaves and rather large heads of white or rose-tinged flowers. Involucre conic or cylindric, of 7–15 linear acuminate equal bracts, somewhat fleshy at base, and a few loose calyculate outer ones. Achenes terete, somewhat fusiform, obscurely few-ribbed, attenuate into a slender beak. Pappus white, of 10–15 slender bristles, softly long-plumose from the base to near the tip.

1. *N. californica* (Nutt.) Greene. Rather stout, glabrous; stems white, 6–9 dm. high; leaves oblong, pinnatifid, sessile and clasping, the upper reduced; heads many in a paniculate-corymbose inflorescence, 1.5–2 cm. high; ligules rather short; outer achenes pubescent; beak slender, equaling the body; pappus dull white. (*Rafinesquia californica* Nutt.)

Common on rather shady slopes in the foothills and in the chaparral belt of all the mountains. May–August.

76. TRAGOPOGON L.

Biennial or perennial erect usually branched somewhat succulent herbs, with slender fleshy tap-roots, alternate entire linear-lanceolate long-acuminate leaves

clasping at the base, and long-peduncled large heads of purple or yellow flowers. Involucre cylindric, its bracts in 1 series, acuminate, united at the base. Ligules truncate, 5-toothed. Achenes linear, terete or 5-angled, 5-10-ribbed, with slender beaks or the outer beakless. Pappus bristles in 1 series, plumose, connate at the base.

1. *T. porrifolius* L. (SALSIFY.) Erect, somewhat branched, 5-8 dm. high, glabrous and somewhat succulent; peduncles thickened and hollow for some distance below the head; bracts exceeding the purple flowers; achenes often 4 mm. long, the outer ones with scale-like tubercles, especially on the ribs; beak long, slender; pappus tawny.

A frequent escape from cultivation, especially in the coast valleys.

77. MALACOTHRIX DC.

Annual or perennial herbs with alternate or basal mostly pinnatifid leaves and long-peduncled paniced or solitary heads of yellow rarely white flowers. Involucre campanulate, its principal bracts in 1-2 series, equal or nearly so, with several series of short exterior ones. Receptacle flat, naked or bristly. Rays truncate and 5-toothed at apex. Achenes oblong or linear, glabrous, 10-15-ribbed, truncate or margined and 4-5-toothed at the summit. Pappus bristles in 2 series, the inner naked or minutely serrulate, slender, coherent at the base and deciduous in a ring, the outer few, more persistent.

Annuals, scapose or diffusely branched, 1-5 dm. high.

Heads large, solitary on the scapose peduncles. 1. *M. californica*.

Heads small, numerous on the diffusely branched stems.

2. *M. clevelandi*.

Perennial about 1 m. high.

3. *M. saxatilis*.

1. *M. californica* DC. Annual, scapose, 3 dm. high or less; leaves basal, tufted, laciniately 1-2-pinnatifid into narrow linear lobes, when young woolly with long, loose, soft hairs; heads solitary on naked scapes, large and showy, 5 cm. broad or less; involucre broadly campanulate, about 2 cm. high; outer bracts slender-subulate; flowers pale yellow; achenes narrow, faintly striate-costate; outer pappus of 2 persistent bristles, the inner capillary, deciduous.

Common on sandy soil along the coast and in the interior valleys. March-May.

2. *M. clevelandi* Gray. Annual, paniculately branched, 5 dm. high or less; stems and branches rather naked; only some of the

basal leaves pinnatifid; heads numerous; involucre about 6 mm. high, narrow, few-flowered; bracts usually purplish-tipped; flowers yellow; achenes oblong-linear, minutely striate-costate, 4-5 of the ribs more prominent; outer pappus of 1 persistent bristle and a conspicuous circle of narrow white setulose teeth.

Occasional in the San Gabriel Mountains. More common in the mountains and foothills of Riverside and San Diego Counties. May-July.

3. *M. saxatilis tenuifolia* (Nutt.) Gray. Somewhat suffrutescent and leafy, paniculately branching, perennial, minutely tomentose, soon becoming glabrate or glabrous, 6-12 dm. high; the long slender loosely-paniculate branches bearing slender pedunculate heads; involucre broadly campanulate, about 1 cm. high; the loose calyculate bracts numerous, subulate, passing into similar bractlets on the peduncle; flowers white, changing to rose color; achenes narrowly oblong, 10-15 costate, becoming somewhat 4-5-angled, apex slightly contracted, bearing a very short multidenticulate white border.

Common in stony places in the foothills, especially toward the coast. April-May.

78. LEONTODON L. DANDELION.

Perennial acaulescent herbs, with basal pinnatifid or sinuate-dentate leaves, and large heads solitary on hollow scapes. Involucre oblong or campanulate, its inner bracts in 1 series, erect, the outer short in several series and spreading. Receptacle flat, naked. Rays 5-toothed at the apex. Achenes oblong or narrowly fusiform, 4-5-angled, 5-10-nerved, roughened or spinulose above, tapering into a very slender beak. Pappus of numerous unequal simple persistent bristles. (*Taraxacum*.)

1. *L. taraxacum* L. Perennial acaulescent herb, with pinnatifid or sinuate leaves, and large heads of yellow flowers terminating naked hollow scapes; involucre bracts of two sorts, the outer reflexed, the inner erect in a single series; achenes greenish-brown, oblong-ovate, 4-5-ribbed, spinulose above, attenuated into a long slender beak; pappus of numerous unequal simple capillary bristles.

The common Dandelion is becoming frequent in lawns.

2. *L. erythrospermum* (Andrz.) Britton. Resembles the common Dandelion, being best distinguished by the red instead of greenish-brown achenes.

This species is frequent in the San Francisco Bay region, and is to be expected in the lawns of southern California as well.

79. SONCHUS L. SOW-THISTLE.

Annual succulent herbs with alternate mostly auriculate-clasping entire or pinnatifid prickly-margined leaves

and yellow flowers in corymbose or paniculate heads. Involucre usually becoming thickened and more or less conic at base, its bracts imbricated in several series, the outer successively smaller. Receptacle flat, naked. Achenes flattened, 10–20-ribbed, truncate. Pappus of copious soft white simple capillary bristles usually falling away connected.

1. *S. oleraceus* L. Stoutish, 5–10 dm. high, sparingly leafy, glabrous or with a few glandular hairs on the pedicels and involucre, glaucescent; leaves obovoid or narrower, runcinate-pinnatifid, toothed but not prickly-margined, amplexicaul, the auricles straight, acute; achenes striate-nerved, transversely rugulose-scabrous.

Common everywhere, flowering at all seasons. Native of Europe.

2. *S. asper* (L.) All. Stouter than the last, the stems distinctly angled, very leafy; leaves entire or pinnatifid, prickly-margined, the auricles helicoid and appressed to the stem; achenes 3-nerved on each side, otherwise smooth.

A less common weed than the last. Native of Europe.

80. LACTUCA L.

Tall leafy herbs with small paniced heads. Involucre cylindric, its bracts imbricated in several series, the outer shorter. Receptacle flat, naked. Achenes flattened, 6–10-ribbed, beaked. Pappus of copious white or brownish capillary bristles.

1. *L. virosa* L. Biennial, glaucous; stems leafy, paniculately branched, hirsute at the base or glabrous throughout, 6–18 dm. high; leaves oblong to oblong-lanceolate, spinulose-margined, denticulate or pinnatifid, sessile or auriculate-clasping, midrib spinulose or hispid; heads 4–8 mm. broad, 6–12-flowered, very numerous, in an open panicle; involucre cylindric; ligules yellow; achenes obovate-oblong, about equaling the filiform beak; pappus white. (*L. scariola* L.)

Rather common in streets about Los Angeles. Native of Europe.

81. AGOSERIS Raf.

Perennial or annual herbs, mostly acaulescent, with tufted basal leaves, and solitary heads of yellow or rarely purple flowers at the ends of naked or bracted scapes. Involucre campanulate to oblong, its bracts imbricated in several series. Receptacle flat, naked or faveolate. Achenes not flattened, 10-ribbed, beaked at the summit. Pappus of copious slender simple white bristles.

1. *A. plebeia* Greene. Robust, 4-6 dm. high; leaves narrowly oblanceolate, pinnatifid into slender ascending lobes, apex usually entire and slenderly acuminate; ligules short, deep yellow, scarcely or not at all surpassing the involucre bracts, these woolly at the base; achenes 4-5 mm. long; the beak 10-12 mm. long; pappus soft, white.

Occasional in the San Gabriel and Santa Ana Mountains. May-July.

2. *A. retrorsa* (Benth.) Greene. Peduncles usually about 3 dm. high; herbage woolly-pubescent, the wool more or less deciduous in age; leaves pinnately parted into narrowly linear or lanceolate retrorse segments; outer involucre bracts broad, inner linear, narrowly acuminate, equaling the pappus; ligules short; achenes 5-6 mm. long, beak slender, 18-20 mm. long.

Summit of Santiago Peak. May-July.

82. CREPIS L.

Perennial or annual herbs, with alternate or basal mostly toothed or pinnatifid leaves, and small or middle-sized heads, usually paniculate-corymbose, of yellow flowers. Involucre cylindric or campanulate, its principal bracts in 1 series, equal, with a number of exterior smaller ones, 10-20-ribbed or -nerved, not transversely rugose, beakless. Pappus copious, of very slender white bristles.

1. *C. biennis* L. Annual or biennial, pubescent or hirsute, leafy at least below, branched above, 6-9 dm. high; leaves runcinate-pinnatifid, oblong or spatulate, at least the upper clasping; heads several, subcorymbose, 2.5-4 cm. high; involucre canescent or pubescent, 8-12 mm. high, its principal bracts linear-lanceolate, downy within; achenes glabrous, 13-striate.

Occasional along streets in Los Angeles and Pasadena.

83. HIERACIUM L.

Perennial hispid or villous herbs, with alternate or basal leaves, and solitary corymbose or paniculate, small or middle-sized heads of usually yellow flowers. Involucre with its principal bracts in 1-3 series, the outer gradually smaller or abruptly much smaller. Receptacle flat, naked or short fimbriate. Achenes terete or 4-5-angled, 10-15-ribbed, beakless. Pappus copious, of 1-2 rows of simple rather stiff persistent brownish bristles.

1. *H. parishii* Gray. Puberulent above with no glandular hairs, leafy up into the narrowly oblong panicle, 3-6 dm. high; lower leaves shaggy-hirsute, lanceolate, 12-18 cm. long, tapering to the base or margined petiole, with 5-8 salient teeth to each margin; upper leaves linear-lanceolate, entire; peduncles seldom much longer and often shorter than the heads; involucre pale, granulose-puberulent, oblong-campanulate, of rather numerous narrow acute or acutish bracts; flowers 15-30, yellow; achenes columnar, about 3 mm. long; pappus sordid or dull white.

Occasional in the San Gabriel and San Bernardino Mountains. June-August.

GLOSSARY

acaulescent, apparently stemless; the proper stem being very short or subterranean.

accrescent, growing larger after flowering.

accumbent, lying against a thing.

The cotyledons are *accumbent* when they lie with their edges against the caulicle.

acerose, needle-shaped.

achene, a dry indehiscent 1-seeded fruit.

acicular, needle-shaped, more slender than *acerose*.

aculeate, armed with prickles.

acuminate, taper-pointed.

acute, ending in a point less than a right angle.

adherent, sticking to, or growing fast to another body.

adnate, born adherent.

æstival, produced in summer.

æstivation, the arrangement of parts in a flower-bud.

alate, winged.

alliaceous, with the odor of onions.

alternate, one after another.

alveolate, honeycomb-like.

ament, the scaly spike of trees, like the alder and willow.

amphitropous, attached by the middle and having the micropyle at one end and the chalaza at the other.

amplexicaul, clasping the stem by the base.

anatropous, inverted, when the micropyle is at the same end as the hilum.

ancipital, 2-edged.

androgynous, having both staminate and pistillate flowers in the same cluster.

annual, producing flowers and fruit the first year and then dying.

anterior, in a flower, is the part next the bract. See *posterior*.

anther, the part of the stamen which bears the pollen.

antheriferous, anther-bearing.

anthesis, the period of flowering.

antrorse, directed upward.

apetalous, destitute of petals.

apical, belonging to the apex.

apiculate, tipped with a small point.

apophysis, any irregular swelling.

aquatic, growing in water.

arachnoid, cobwebby.

arborescent, tree-like.

arcuate, bent or curved.

areolate, marked out into little spaces.

aristate, awned.

aristulate, short-awned.

articulated, jointed.

ascending, rising obliquely upward.

assurgent—see *ascending*.

auriculate, with auricles or ear-like appendages.

awl-shaped, sharp-pointed from a broader base.

awn, a bristle or beard-like appendage.

axillary, occurring in an axil.

baccate, berry-like.

barbate, bearded.

berry, a fruit, pulpy or juicy throughout, as a grape.

biennial, flowering and dying the second year.

bifid, 2-cleft to about the middle.

bifurcate, 2-forked.

bilabiate, 2-lipped.

bladdery, thin and inflated.

blade, the expanded portion of a leaf or petal.

bloom, a whitish powder.

brachiate, in pairs, each pair

arranged at right angles to the next.

bract, the leaf of an inflorescence.

bractlet, bracts that occur on flower-pedicels.

bulb, a leaf-bud with fleshy scales, usually subterranean.

bullate, appearing as if blistered or bladdery.

caducous, dropping off very early.

cæspitose, growing in tufts.

callous, hardened.

calyptra, a hood.

calyx, the outer set of the perianth.

campanulate, bell-shaped.

canescent, grayish-white, caused usually by a covering of fine whitish hairs.

capitate, having a head.

capsule, a dry dehiscent fruit formed from a compound pistil.

carinate, keeled.

carpel, a pistil-leaf or sporophyll.

caruncle, an excrescence at the hilum of some seeds.

catkin, see ament.

caudate, tailed.

caudex, an upright stock.

caudicle, the stalk of a pollen-mass.

caulescent, having an obvious stem.

caulicle, rudimentary stem of a seedling.

cauline, belonging to the stem.

cell, the cavity of an anther or ovary.

chaff, small membranous scales on the receptacle of *Compositæ*.

chaparral, a thick growth of shrubs, such as manzanita or scrub-oak.

chartaceous, of the texture of paper.

ciliate, beset on the margin with a fringe of hairs or bristles.

clavate, club-shaped.

claw, the stalk-like base of some petals.

cleistogamous, fertilized in closed buds.

cleft, cut into lobes.

comose, bearing a tuft of hairs.

commis sure—see page 253.

connate, united or grown together.

connivent, converging.

convolute, rolled up lengthwise.

cordate, heart-shaped.

coriaceous, leathery in texture.

corm, a solid bulb.

cornute, horned.

corolla, the inner set of perianth leaves.

corona, a crown.

corymb, a flat or convex flower-cluster.

corymbose, in corymbs.

costa, a rib.

cotyledons, the seed-leaves.

creeping, growing flat on the ground and rooting.

crenate, with rounded teeth.

cruciate, cross-shaped.

cucullate, hood-shaped or hooded.

culm, the stem of grasses or sedges.

cuneate, wedge-shaped.

cuspidate, tipped with a sharp stiff point.

cyme, a cluster of centrifugal inflorescence.

cymose, with cymes.

deciduous, falling off.

decompound, several times compound.

decumbent, reclined on the ground, the summit tending to rise.

decurrent, prolonged on the stem beneath the insertion.

decussate, arranged in pairs, which successively cross each other.

dehiscence, the regular splitting open of a capsule or anther.

dentate, toothed, the teeth pointing outward.

diadelphous—see page 188.

dichotomous, 2-forked.

diffuse, spreading widely and irregularly.

digitate—leaflets are digitate when they are all borne on the end of a petiole.

dissected, cut deeply into many lobes or divisions.

dissepiments, the partitions in a compound ovary.

diurnal, expanded during the day, closed at night.

distichous, 2-ranked.

distinct, free.

divaricate, widely divergent.

divided, cut into divisions down to the midrib.

drupe, a fleshy fruit containing a stone, as the plum.

echinate, armed with prickles.

elliptical, oval or oblong, with the ends regularly rounded.

emarginate, notched at the summit.

emersed, raised out of water.

endocarp, the inner layer of a pericarp.

endosperm, the nutritive matter in a seed, surrounding the embryo.

ephemeral, lasting for a day or less.

epigynous, upon the ovary.

equitant, folded longitudinally, and each embracing the next within.

erose, eroded as if gnawed.

exocarp, outer layer of a pericarp.

extorse, turned outward.

falcate, scythe-shaped.

farinaceous, mealy in texture.

fascicle, a close cluster.

fastigate, close, parallel and upright.

faveolate, *favose*—see *alveolate*.

ferruginous, resembling iron-rust.

filament, the stock of a stamen.

filiform, thread-like.

fimbriate, fringed.

fistulose, hollow and cylindric.

flabelliform, fan-shaped.

flavescent, yellowish.

flexuous or *flexuose*, bending in opposite directions, zig-zag.

floccose, woolly.

foliate, provided with leaves.

follicle, a pod composed of a single carpel, opening down the inner suture.

fruit, the mature ovary and all that is connected with it.

frutescent, somewhat shrubby.

fugacious, soon perishing or falling off.

fulvous, tawny.

funiculus, the stock of an ovule or seed.

furfuraceous, bran-like.

fusiform, spindle-shaped.

galea, a helmet-shaped body.

geniculate, bent abruptly.

gibbous, somewhat swollen or enlarged.

glabrate, becoming glabrous or almost so.

glabrous, smooth, not hairy.

glands, small cellular organs which secrete certain substances, such as oil.

glandular, with glands.

glaucous, slightly glaucous.

glaucous, covered with a bloom.

glomerate, closely aggregated in a dense head.

glume, floral bracts in grasses.

gramineous, grass-like.

habit, the general aspect of a plant.

habitat, the place where a plant grows.

hairy, beset with rather long hairs.

hastate, halberd-shaped.

herb, a plant that is not woody.

hilum, the scar of a seed, the place of attachment.

hirsute, with stiffish hairs.

hirsutulous, minutely hirsute.

hispid, beset with stiff hairs.

hoary—see *canescent*.

horn, a spur.

hyaline, transparent or partly so.

imbricate, overlapping one another, like shingles.

immersed, growing wholly under water.

incised, cut rather deeply and irregularly.

incumbent—the cotyledons are incumbent when the back of one of them lies against the caulicle.

inferior, growing below some other organ.

inflorescence, the arrangement of the flowers on a stem.

insertion, the place or mode of attachment.

introrse, turned or facing inward.

involucel, a small involucre.

involucre, a whorl or set of bracts around a flower, umbel or head.

keel, a projecting ridge.

lacerate, appearing as if torn.

laciniate, slashed.

lanate, woolly.

lanceolate, lance-shaped.

legume, a simple pod which dehisces in 2 pieces.

lenticular, lens-shaped.

ligneous, woody.

ligulate, strap-shaped.

limb, the border of a corolla.

linear, narrow and flat, the margins parallel.

loculicidal, dehiscent through the back of each cell.

lodicule—see page 18.

lunate, crescent-shaped.

lyrate, lyre-shaped.

marcrescent, withering without falling off.

maritime, belonging to the sea-coast.

membranous, thin and soft, like a membrane.

merous, the number of parts in a circle.

mesocarp, the middle part of a pericarp.

monœcious, having stamens or pistils only.

mucronate, tipped with an abrupt short point.

mucronulate, diminutive of the last.

murice, beset with short prickly points.

muticous, blunt, pointless.

nectar, a sweet secretion in flowers.

nectariferous, having nectary.

nerve, veins, usually confined to those that are parallel.

nervose, conspicuously nerved.

nodose, knotty.

oblong, 2–4 times as long as broad.

obovate, inversely ovate.

obtuse, blunt or rounded at the end.

ochroleucous, yellowish-white.

oculate, with eye-shaped markings.

opposite, on opposite sides of the stem, in pairs.

orbicular, circular in outline.

orthotropous, straight, when the micropyle is on the opposite end from the hilum.

oval, broadly elliptic.

ovary, that part of the pistil containing the ovules.

ovate, shaped like an egg, with the broad end downward.

ovoid, ovate or oval.

ovuliferous, ovule-bearing.

palea, chaff.

palmate—see *digitate*.

panicle, an open and branched cluster, a compound raceme.

papilionaceous, butterfly-shaped.

papilla, a little nipple-shaped protuberance.

papillate, *papillose*, covered with papillæ.

pappus, the bristles, scales, etc.,

- at the apex of the achenes in the Compositæ.
- parasitic*, living on another plant or animal.
- parietal*, attached to the walls of the ovary.
- pectinate*, pinnatifid into narrow divisions, like the teeth of a comb.
- pedate*, like a bird's foot.
- pedicel*, the stalk of each flower in a cluster.
- pedicellate*, pedicelled.
- peduncle*, a flower-stalk, whether of a single flower or of a cluster.
- peltate*, shield-shaped.
- pepo*, a fruit like the melon.
- perennial*, lasting from year to year.
- perfect*, having both stamens and pistil.
- perianth*, the floral leaves—the calyx and corolla.
- perigynium*, bodies around a pistil; see page 66.
- perigynous*, the petals and stamens borne on the calyx.
- personate*, masked; a bilabiate flower with a palate in the throat.
- petal*, a leaf of the corolla.
- petaloid*, petal-like.
- petiole*, a stalk of a leaf.
- petiolulate*, a stalked leaflet.
- pilose*, clothed with long slender hairs.
- pinnate*, with leaflets arranged along the side of a common petiole.
- pinnatifid*, same as pinnately cleft or divided.
- pistil*, the seed-bearing organ of a flower.
- pistillate*, having a pistil.
- placenta*, the part of the ovary to which the ovules are attached.
- plaited*, folded lengthwise.
- plumose*, feathery.
- pollen*, the fertilizing powder contained in the anthers; the microspores.
- polygamous*, having some perfect and some unisexual flowers.
- pome*, a fleshy fruit, such as the apple and pear.
- posterior*, portion of a flower is that toward the axis.
- primordial*, earliest formed.
- procumbent*, trailing on the ground.
- proliferous*, where a new branch rises out of an older one, or one cluster of flowers out of another.
- prostrate*, lying flat on the ground.
- pruinose*, frosted.
- puberulent*, with fine short pubescence.
- pubescent*, with fine soft hairs.
- punctate*, dotted with minute holes.
- puncticulate*, minutely punctate.
- pungent*, prickly-pointed.
- pyriform*, pear-shaped.
- raceme*, with 1-flowered pedicels arranged along a common peduncle.
- racemose*, bearing racemes.
- rachis*, the axis, especially of a spike.
- receptacle*, the axis or support of a flower.
- regular*, all the parts of a circle similar in shape.
- reniform*, kidney-shaped.
- repand*, wavy-margined.
- reticulated*, netted.
- retuse*, with a blunt somewhat indented apex.
- revolute*, rolled back.
- rootstock*, root-like, usually underground stems.
- rosulate*, in a rosette.
- rotate*, wheel-shaped.
- rugose*, wrinkled.
- runcinate*, coarsely saw-toothed.
- runner*, a slender prostrate branch rooting at the ends or joints.
- saccate*, sac-shaped.
- sagittate*, arrow-shaped,

salsuginous, growing in brackish places.

salver-shaped, with a border spreading at right angles to a slender tube.

samara, a winged fruit or key.

scabrous, rough or harsh to the touch.

scape, a peduncle rising from the ground or near it.

scapiform, scape-like.

scarious, thin, dry and membranous.

scorpioid, curved or circinate at the end.

scrobiculate, pitted.

scutellate, saucer-shaped.

secund, 1-sided.

segment, a subdivision or lobe.

sepal, a leaf or division of the calyx.

septate, divided by partitions.

septicidal, where the dehiscence is through the partitions.

serrate, the margin cut into teeth pointing upward; saw-toothed.

serrulate, minutely serrate.

sessile, not stalked.

seta, a bristle, or bristle-like.

setaceous, bristle-like.

silicle, a short silique.

silique, capsule of the mustard family.

sinuate, with margins alternately bowed inward and outward.

sinus, the angle between two lobes.

smooth, not rough, or same as glabrous.

sordid, dirty in hue.

spadix, a fleshy spike of flowers.

spathaceous, resembling, or furnished with, a spathe.

spathe, a bract which enwraps an inflorescence.

spatulate, club-shaped.

spike, flowers sessile on an elongated rachis.

spinescent, tipped with a spine.

spinose, spiny.

spur, any hollow appendage which looks like a spur.

squamate, furnished with scales.

squarrose, where scales, leaves or any appendages spread widely from the axis on which they are thickly set.

stalk, stem, petiole, peduncle, etc.

stamen, the organ which bears the pollen, composed of an anther and usually a filament.

staminate, furnished with stamens.

staminodium, an abortive stamen.

standard, the upper petal of a papilionaceous flower.

stellate, star-like.

stigma, the receptive part of the pistil.

stipe, the stalk of the pistil.

stipitate, furnished with a stipe.

stipules, appendages situated on either side of the base of some leaves.

stolon, a trailing or reclined and rooting shoot.

stomata, breathing pores of leaves.

stramineous, straw-like.

striate, marked with slender longitudinal stripes.

strict, close and narrow; straight and narrow.

strigose, beset with stout appressed hairs or bristles.

style, the stalk between the ovary and stigma.

stylopodium, an enlargement at the base of the style.

subulate, awl-shaped, tapering from a broad base to a sharp point.

suckers, shoots from subterranean branches.

suffrutescent, somewhat woody or shrubby at the base.

sulcate, grooved longitudinally.

superior, above.

suture, the line of junction of contiguous parts grown together.

sympetalous, petals united.

tawny, dull yellowish, with a tinge of brown.

tendril, a thread-like organ used in climbing.

terete, cylindrical.

ternate, in 3's.

testa, the outer seed coat.

throat, the expanded portion between the lobes and the proper tube in a sympetalous corolla.

thyrsus, a compact and pyramidal panicle of cymes.

torus, the receptacle of the flower.

trifid, 3-cleft.

trifoliolate, with 3 leaflets.

triquetrous, sharply 3-angled.

truncate, as if cut off at the top.

tuberculate, bearing little pimple-like bodies.

tunicate, coated, as an onion.

turbinate, top-shaped.

umbel, an inflorescence in which a number of pedicels of nearly equal length spring from the same point, as in the parsley family.

umbellate, in umbels.

unarmed, destitute of thorns or spines, etc.

uncinate, hook-shaped.

undulate, wavy-margined, or wavy.

unguiculate, clawed.

unisexual, having stamens or pistils only.

urceolate, urn-shaped.

utricle, a small thin-walled, 1-seeded fruit.

valve, one of the pieces into which a dehiscent fruit splits.

valvate, opening by valves; in æstivation when the parts just meet and do not overlap.

venation, the veining of leaves.

ventral, the opposite of dorsal.

ventricose, inflated on one side.

verrucose, warty.

versatile, attached by a point so that it may swing to and fro.

verticil, a whorl.

vespertine, appearing or expanding in the evening.

virgate, wand-like.

viscid, having a glutinous surface.

wedge-shaped, broad above, tapering to the base by straight lines.

whorled, arranged in whorls or circles.

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